PUBLIC WORKS

city county and state

May 1950

Water Works Today and Yesterday

Heating Pavements for Snow and Ice Removal

Sludge Dewatering with Vacuum Filters

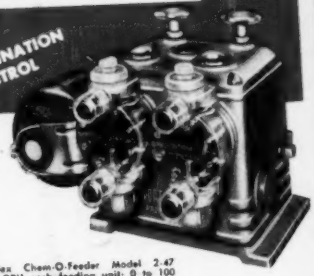
Using Anthrafilt in Water Filtration

Public Works Planning—Sewerage and Recreation

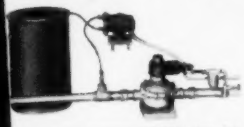
Aquatic Biology for the Water Works Engineer

pH CONTROL
COAGULATION CONTROL
FILTRATION CONTROL
CORROSION CONTROL
ZEOLITE GENERATION CONTROL
TASTE AND ODOR CONTROL
ALGAE CONTROL
TOOTH DECAY CONTROL
BACTERIA CONTROL
RUST CONTROL
SEWAGE TREATMENT
DECHLORINATION CONTROL

Control Starts Here
WITH
% PROPORTIONEERS %
PROPORTIONING PUMPS • DIATOMACEOUS EARTH FILTERS

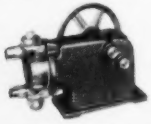


FOR PUMPED WATER SYSTEMS Constant Rate Feeder — Heavy Duty Midget Chem-O-Feeder. Feeds 0-7½ GPH at 0 to 85 p.s.i.



New Duplex Chem-O-Feeder Model 2-47 capacity 8 GPH each feeding unit; 0 to 100 p.s.i. Available Simplex, Duplex and Triplex models.

FOR VARIABLE FLOW SYSTEMS Flow Proportional Feeder — Automatic and Proportional Chem-O-Feeder. Feeds 0-5 GPH at 4-100 p.s.i.



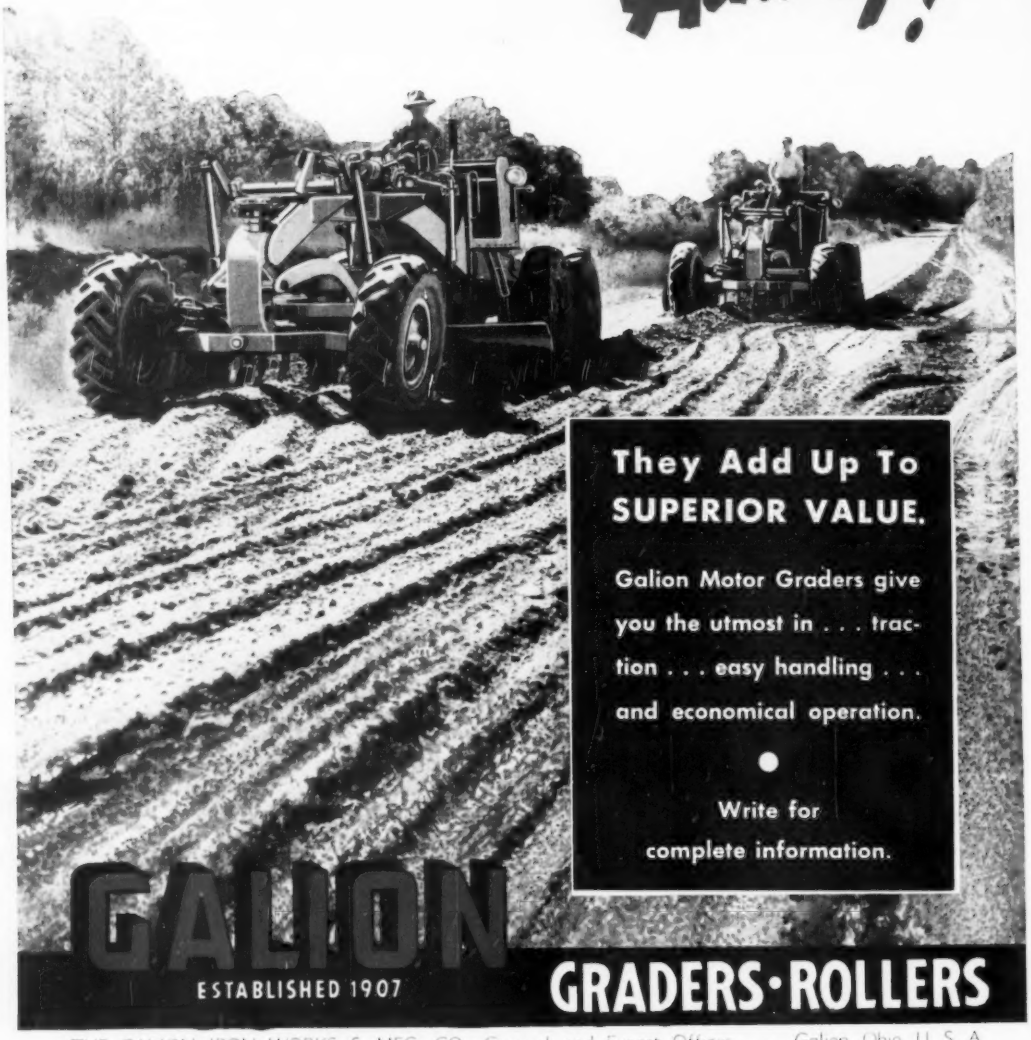
FOR YOUR CAMP Du-Self — a complete Package Unit — for water treating. For flows up to 25 GPM and 75 p.s.i.

FOR YOUR SWIM POOL For crystal clear swim pool water — Pur-O-Cel Diatomaceous Earth Filter, Triplex Model.

Precision control with %Proportioneers% equipment is solving today's most difficult problems of water and sewage treatment — eliminating inaccurate, hit-or-miss methods that for years have plagued engineers. %Proportioneers% new Duplex Chem-O-Feeder illustrates up-to-date, precision control at its best. It feeds two different solutions, with feeding rates each instantly adjustable while the pump is operating. You simply turn the knobs to set the stroke lengths — a magnifying register glass shows exact reading in thousandths of an inch over a range of 2 to 13 cc per stroke. The clear plastic See-Thru reagent heads handle any chemical used in the water works field and reveal the constant flow of solution fed. The line of %Proportioneers% equipment is complete — over 30,000 installations are setting new standards of precision control and dependable operation. Write for bulletins and recommendations.

% PROPORTIONEERS, INC. %
356 Harris Avenue, Providence 1, R. I.

Galion DESIGN CONSTRUCTION PERFORMANCE Add Up!

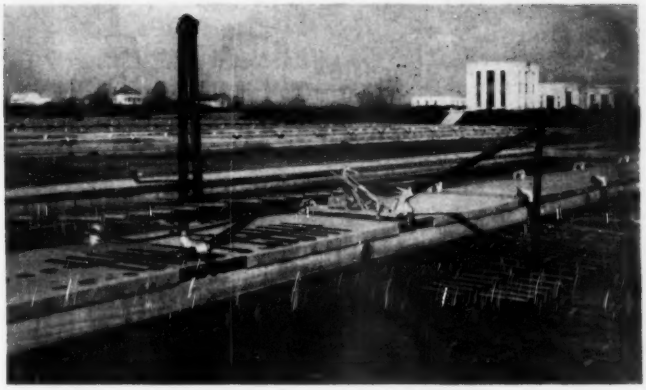

They Add Up To
SUPERIOR VALUE.
Galion Motor Graders give you the utmost in . . . traction . . . easy handling . . . and economical operation.
Write for complete information.
GALION
ESTABLISHED 1907
GRADERS • ROLLERS

THE GALION IRON WORKS & MFG. CO., General and Export Offices — Galion, Ohio, U. S. A.
Cable address, GALIONIRON, Galion, Ohio

THE OVERWHELMING MAJORITY *specified* "CHICAGO" SWING DIFFUSERS AND PRECISION TUBES

Sewage Treatment Plant
Columbus, Ohio

Paul A. Uhlmann & Associates
ENGINEERS



THE overwhelming majority of Consulting and Design Engineers who planned equipment for Activated Sludge Sewage Treatment Plants in the past five years specified CHICAGO Swing Diffusers and Precision Diffuser Tubes. It's a question of "Diffused Air Economics". Continuous operation of an Aeration Battery is possible only with Swing Diffusers. The most economical operation is possible with Precision Diffuser Tubes.

What Plant Operators Say

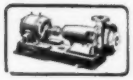
- **Low first cost.**
- **Continuous performance without extra tanks.**
- **Economical operation—less power consumed—less labor.**
- **Tubes easily and economically cleaned.**

WRITE FOR FULL ENGINEERING DETAILS

CHICAGO PUMP COMPANY

SEWAGE EQUIPMENT DIVISION

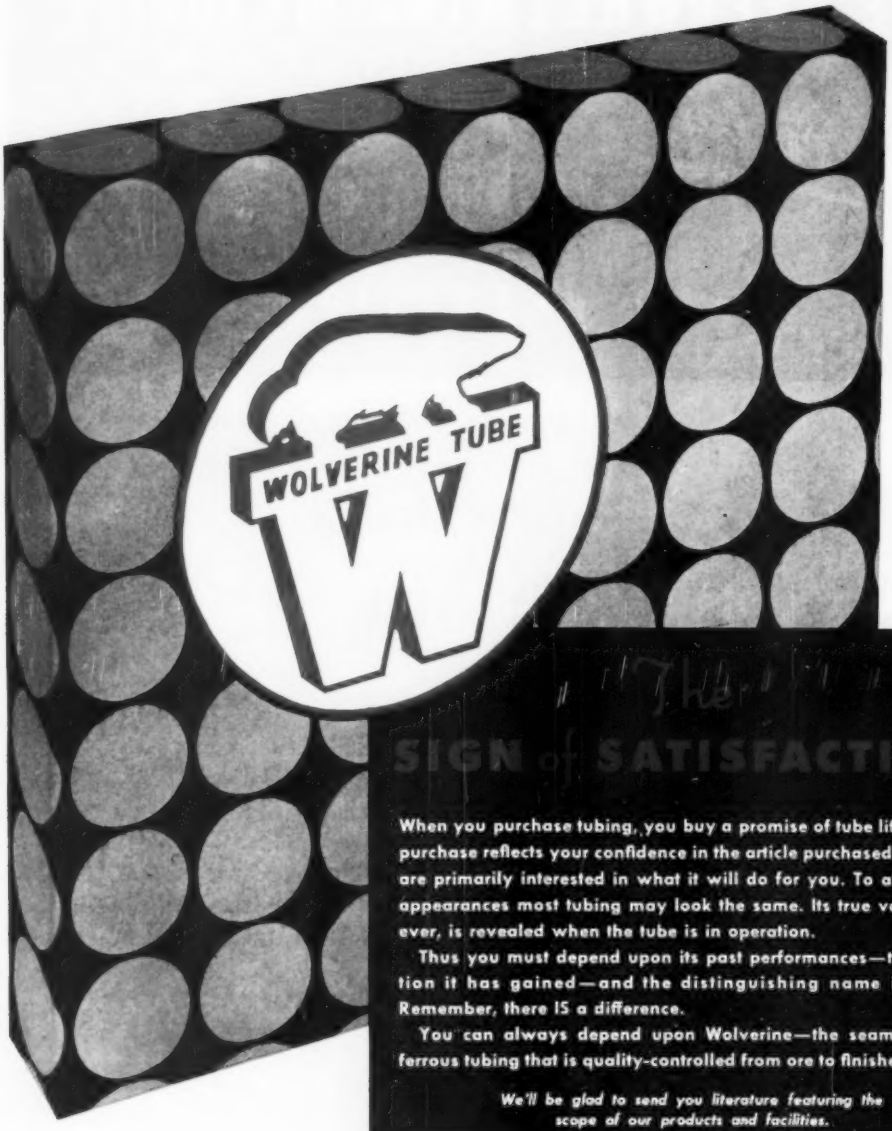
2300 WOLFRAM STREET **CHICAGO 18, ILLINOIS**



Flush Kleen, Scru-Peller, Plunger, Horizontal and Vertical Non-Clogs Water Seal Pumping Units, Samplers.

Swing Diffusers, Stationary Diffusers, Mechanical Aerators, Combination Aerator-Clarifiers, Comminutors.

When writing, we will appreciate your mentioning PUBLIC WORKS



The SIGN of SATISFACTION

When you purchase tubing, you buy a promise of tube life . . . Your purchase reflects your confidence in the article purchased—and you are primarily interested in what it will do for you. To all outward appearances most tubing may look the same. Its true value, however, is revealed when the tube is in operation.

Thus you must depend upon its past performances—the reputation it has gained—and the distinguishing name it carries. Remember, there IS a difference.

You can always depend upon Wolverine—the seamless, non-ferrous tubing that is quality-controlled from ore to finished product.

We'll be glad to send you literature featuring the scope of our products and facilities.

WOLVERINE TUBE DIVISION

Calumet & Hecla Consolidated Copper Company

INCORPORATED

MANUFACTURERS OF SEAMLESS, NON-FERROUS TUBING

1451 CENTRAL AVENUE • DETROIT 9, MICHIGAN

Plants at Detroit, Mich. and Decatur, Ala.

When you need special information—consult READERS' SERVICE DEPT. *on pages 85-89.*

PUBLIC WORKS JOURNAL CORP.
310 East 45th St., New York 17, N.Y.

Officers
W. A. Hardenbergh, *President*
Croxton Morris, *Vice Pres & Treas.*
A. Prescott Folwell, *Secretary*

Editors
A. Prescott Folwell
W. A. Hardenbergh

Assistant Editor
Edward B. Rodie

Editorial Assistant
Helen E. Quinn

General Manager
Croxton Morris

Art Consultant
Nathaniel Pousette-Dart

Advertising Manager
Arthur K. Akers

Production Supervisor
I. James Barger

Circulation Supervisor
Edward B. Rodie

Advertising Offices
New York 17, 310 East 45th St.
Arthur K. Akers, Adv. Mgr.
Burton M. Yost

Chicago 11, Ill.,
612 N. Michigan Ave.
Lewis C. Morris, Western Mgr.

Cleveland 10, Ohio, Villa Beach 2.
15445 Lake Shore Blvd.
Robert J. Shea, Mgr.

Dallas 6, Texas, 5241 Bonita Ave.
Francis J. Burt

Los Angeles 14, Calif.,
Halliburton Bldg., Suite 318
Simpson-Reilly, Ltd.

San Francisco 3, Calif.
Central Tower, Suite 814
Simpson-Reilly, Ltd.

NBP CCA

Public Works T. M. Reg. U.S. Pat. Off.

Published Monthly by Public Works Journal Corporation. Office of Publication at Orange, Conn. Editorial and Advertising offices at 310 East 45th Street, New York 17, N. Y. Subscription rates: U.S.A. and possessions, $3.00. All other countries, $4.00. Single copies 35¢ each, except special issues which are $1. Acceptance under Section 34.64 P. L. & R. Authorized.

Copyright 1950 by
Public Works Journal Corp.

Public Works

THE ENGINEERING AUTHORITY IN THE CITY-COUNTY FIELD

Edited by
W. A. HARDENBERGH and A. PRESCOTT FOLWELL

CONTENTS FOR MAY, 1950

Water Works—Today and Yesterday 33
Aquatic Biology for the Water Works Engineer. *By Jas. B. Lackey* 39
Heating Pavements for Ice Prevention 42
Dewatering Sewage and Industrial Waste Sludges With Vacuum Filters 44
Water Borne Disease Incidence in 1948 46
Nine Gas Operated Engines for Sewage Treatment Plant 46
Chicago Water Department Uses Radiotelephone 47
How Equipment Is Used Effectively in County Highway Work 48
How Anthrafilt Is Used in Water Filtration. *By J. A. Oldenburg* 50
The Case for Housing Trickling Filters. *By Hugh C. Leibee and Robert J. Ellison* 53
Planned Public Works—Sewerage and Recreation. *By R. R. McIntosh* 54
Liberty Sewage Treatment Plant Operation. *By Harry Eichenauer* 68
New York Garbage Collection Practices 69
New Graders for So. Dakota 77

PUBLIC WORKS DIGESTS

The Water Works Digest 59
The Highway and Airport Digest 65
The Sewerage and Refuse Digest 71

DEPARTMENTS AND SECTIONS

The Editors' Page 6
Letters to The Editor 17
Books in Brief 20
Leaders in Public Works 46
New Public Works Equipment 79
The Engineers' Library 85
Worth Telling. *By Arthur K. Akers* 90

The 1950 volume of Public Works will be available on microfilm through University Microfilms, 313 N. First St., Ann Arbor, Mich.

THE EDITOR'S PAGE

For Better Engineering Skills for the Military

IN the proposed Army reorganization bill (HR5794) now before Congress, amendments designed to protect and improve the professional status of engineers have been inserted. These amendments were worked out cooperatively by organized engineering groups and the high command of the Army, and were presented to Congress by the Army. The most important amendment is as follows:

> Under regulations prescribed by the Secretary of the Army officers of the Army assigned to technical, scientific or other professional duties shall possess qualifications suitable for the performance of those duties; and, when the duties involve the performance of professional work, the same as or similar to that usually performed in civil life by members of a learned profession, such as engineering, law, medicine or theology, they shall, unless the exigencies of the situation prevent, possess, by education, training or experience, qualifications equal or similar to those usually required of members of that profession.

We feel that, if enacted into law, this will represent a very great forward step in the program for better and more effective utilization of engineering skills. Much will still remain to be done, but there will be a statutory basis upon which to build. For the first time in the military the engineer will be, by law, a member of a "learned profession"; he will be a professional man. Your editor, who has been one of the workers in this field, is much gratified that this substantial accomplishment has been achieved, and that it has been possible with the cordial support of the Army.

The Revolution in Our Counties

MANY folks are inclined to regard county engineers as estimable old gentlemen of the pre-World War I vintage, doing things in essentially the same way that they did them thirty years ago. Such folks have another guess coming; even a couple of guesses. Let's review the situation briefly.

Prior to 1930, use of equipment in highway construction and maintenance was limited according to present standards; the ten years following were depression years, in which there was always pressure for using unemployed, and for made work. Then came the war, and the period of getting along with whatever was at hand. Many counties came into the post-war period with a scarcity of needed equipment. This situation has now changed.

There are some 2,500 counties which do appreciable highway work. The initial cost of the highway equipment which these counties own approximates one and a quarter billion dollars. Numerous counties own and operate equipment with a present value, allowing for depreciation, in excess of half a million dollars; many have twice as much. What is more, the engineers in charge of the highway program know how to use this equipment to its maximum capacity and effectiveness.

A recent study and survey of this field by your editors have been highly educational. It has revealed many new uses for standard equipment; and in addition it has shown that not all engineers are content with what the manufacturers provide. We have descriptions of more than thirty new ideas for better and more useful on-the-job gadgets and equipment which were designed by county engineers.

This is not to say that all counties are aware of the needs for modern traffic handling, nor for the replacements and additions in equipment that are needed. Some counties are sadly lacking in a political organization designed to insure that engineers are in control of this important work.

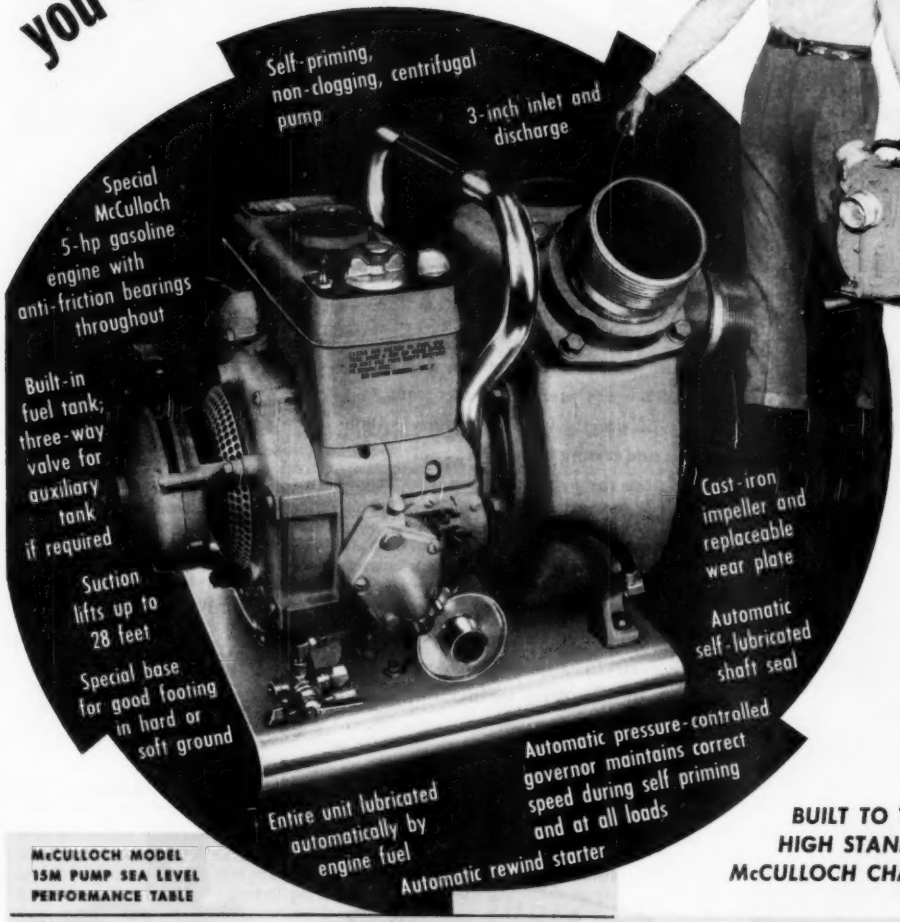
Maybe Face-Lifting Would Help

A 1950 model centrifugal pump looks very much like a centrifugal pump built 20 or 30 years ago. Maybe this has obscured the improvement in pump efficiency. In 1910, the average 2,000-gpm centrifugal pump was guaranteed to have an efficiency of about 70%; in 1930 this had risen to about 80%; and in 1950 it was close to 85%. In cost of operation, what does this mean? Let's suppose you have an old pump, with an efficiency of 72%—very good for the days when you bought it. It requires 100 brake horsepower for operation. Today you can get a centrifugal pump of the same capacity that will do the same work with 85bhp. If electric power is used to drive the pump, and its costs only one-tenth of a cent per kwh, you save, with the new pump, $134 for every one thousand hours of operation. For these data, we credit an assist to a recent bulletin by DeLaval.

If the automobiles of today looked "very much the same as those made 20 years ago" (quoting DeLaval), we do not think that automobile manufacturers would have sold some six million cars last year while expecting to do the same again this year. Maybe it would help to lift some pump faces and make the new and more efficient machines look like they were newer and more efficient. It wouldn't cost too much to try and it might pay off big. And, by the way, pumps aren't the only public works equipment that could be given a modernized appearance.

Here's a 15,000 GPH Pump you can carry in one hand!

Engine and pump together weigh only 57 pounds


Self-priming, non-clogging, centrifugal pump
3-inch inlet and discharge
Special McCulloch 5-hp gasoline engine with anti-friction bearings throughout
Built-in fuel tank; three-way valve for auxiliary tank if required
Suction lifts up to 28 feet
Special base for good footing in hard or soft ground
Cast-iron impeller and replaceable wear plate
Automatic self-lubricated shaft seal
Automatic pressure-controlled governor maintains correct speed during self priming and at all loads
Entire unit lubricated automatically by engine fuel
Automatic rewind starter

McCULLOCH MODEL 15M PUMP SEA LEVEL PERFORMANCE TABLE

TOTAL HEAD INCLUDING FRICTION	HEIGHT OF PUMP ABOVE WATER 10 Ft.	15 Ft.	20 Ft.	25 Ft.
20 ft.	250 GPM			
25 ft.	245	210 GPM	170 GPM	
30 ft.	235	205	165	130 GPM
40 ft.	215	190	160	125
50 ft.	185	165	145	120
60 ft.	135	130	125	105
70 ft.	65	65	65	60

BUILT TO THE SAME HIGH STANDARDS AS McCULLOCH CHAIN SAWS

NATIONWIDE SALES AND SERVICE

McCULLOCH MOTORS
CORPORATION
Los Angeles 45, California
Export Department: 301 Clay St., San Francisco 11, California, U. S. A.

SEND COUPON TODAY

McCULLOCH MOTORS CORP. Dept. MD
Los Angeles 45, California

Please send me complete details on the McCulloch Model 15M Pump.

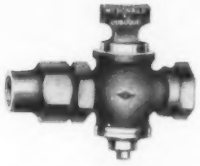
Name_____

Address_____

City_____ Zone____ State_____

EST. 1856
McDonald

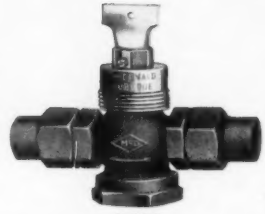
McDONALD CRAFTSMANSHIP
in waterworks brass



E-4721
Solid brass tee handle curb stop. Inlet copper pipe, outlet iron pipe thread.

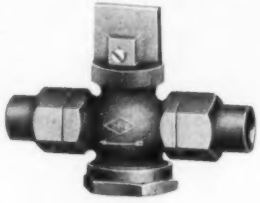
McDonald "Diamond Line" curb and corporation stops are smooth in operation, dependable in service. They are precision made from 85-5-5-5 metals with every step from foundry to final inspection and testing under rigid control. Ground keys fit close for perfect sealing, yet turn easily for trouble-free servicing... clean threads mean easier, faster installation...full waterways assure maximum flow.

For real economy in waterworks brass, for items designed to stay on the job and keep maintenance costs low, specify McDonald—for 94 years only the best. Write for literature and prices.



E-4717
Minneapolis pattern curb stop. Both ends copper pipe couplings. Now furnished with combined cap and tee handle.

E-4701
Corporation Stop.



E-4713
Combined cap and tee handle inverted key curb stop for copper pipe, both ends.

E-4727
Curb Stop for copper service pipe. Minneapolis pattern. Solid brass tee handle.

E-4711
Combined cap and tee handle inverted key curb stop. Inlet copper pipe, outlet iron pipe thread.

A. Y. McDONALD MFG. CO.
DUBUQUE, IOWA
BRASS GOODS • PUMPS • OIL EQUIPMENT

When you need special information—consult READERS' SERVICE DEPT. *on pages 85-89.*

2-WAY RADIO'S **Greatest VALUE!! TODAY and TOMORROW**

with exclusive SENSICON RECEIVER - NOW AVAILABLE in the Dispatcher.

PERMANENT VALUE of ADVANCED DESIGN

The Sensicon Circuit with the Permakay Wave Filter, Statomic Oscillator, Differential Squelch, Capacitance Discriminator, and Thermally Balanced Crystal Oven, all exclusive Motorola developments, has advanced the art to permit practicable adjacent channel operation. Further, it provides the only uncompromised design capable of accepting full modulation on the desired channel, and adaptable to "split-channel" frequency assignments. With "*Instantaneous Deviation Control*" of the transmitter carrier plus the broad nose, steep skirt characteristic of the Sensicon Receiver, you have an advanced design combination which will give superior performance *now and tomorrow!*

RELIABILITY

Put it in and forget about it! It breezes along with peak performance always. With fixed-tuned, sealed circuits, precision compensated elements, quality components and workmanship—the day of radio tinkering is over! Remember! the Sensicon System is *coasting* while ordinary systems using fewer tubes are taxed to the false-economy limit!

UNIVERSAL PACKAGING

Built for quick and easy installation—with full accessibility, *here is the solution* to any mounting problem in any type of vehicle. Choice of new all-in-one front model, or trunk mount unit—both are drawer-type with quick lift cover. Both units provide for complete metering and antenna alignment through the covered ports on front—yet the complete housing is closed against dust or other foreign particles.

ENDURING ECONOMY

A quality communications unit designed to deliver longer sustained service at the lowest operating cost. New single vibrator power supply provides for minimum tube and vibrator replacement.

FREEDOM FROM OBSOLESCENCE

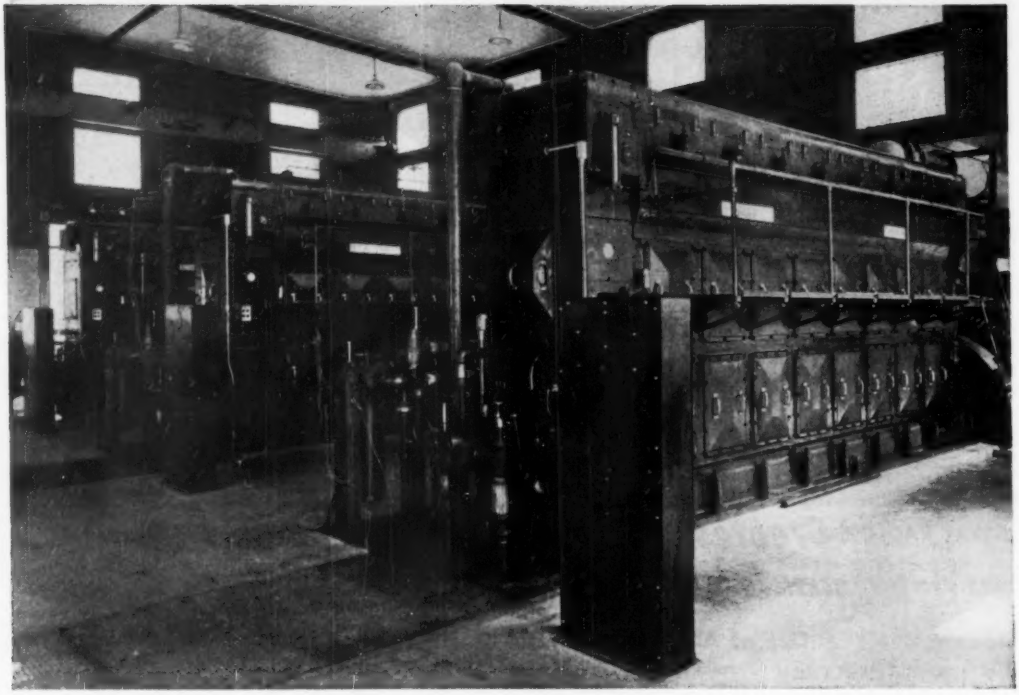
The growth of land mobile services licensees from 5,000 in 1945 to over 17,000 (over 160,000 transmitters) today indicates that channel-splitting is imminent. With adjustable modulation control, I.D.C., and exclusive exchangeable Permakay filter you have every factor in hand for your future protection.

Motorola

4545 Augusta Blvd., Chicago 51 - in Canada: Rogers Majestic, Ltd., Toronto

MADE BY THE WORLD LEADERS IN 2-WAY MOBILE RADIO BACKED BY 20 YEARS RESEARCH, EXPERIENCE, AND SPECIALIZATION IN MOBILE RADIO

When writing, we will appreciate your mentioning PUBLIC WORKS



This Power Plant Will Pay For Itself in Two Years

In May 1949 a new Missouri generating plant went into service with three Dual Fuel Superior engines. This new power plant replaced a steam turbine system of the same kilowatt capacity that was only 11 years old. Yet the new system saved $10,000 in its first four months of operation.

BUT that's only the beginning of their savings. Within the next few months pipeline expansion will make natural gas available. And when hooked-up, it will only be necessary to push a button on the engine to switch from oil to gas or gas to oil. This use of gas will about double the savings on power, according to the plant's chief engineer.

Present plans call for adding a fourth Dual Fuel Superior. And when the new unit is placed in service, the plant's rate of savings will increase to the point where its entire cost will be paid off in less than two years.

One of our representatives can give you all the details on this and other *Superior* Diesel installations. Chances are, he can help you accomplish the same results. Just write and tell us when he should call. Or, if you prefer, send for our new, fully illustrated booklet, *Superior Diesel for Stationary Application.*

THE NATIONAL SUPPLY COMPANY
SUPERIOR ENGINE DIVISION
Plant and General Sales Office: Springfield, Ohio

THE NATIONAL SUPPLY COMPANY NSCO

Superior DIESELS

Locomotive · Marine · Oil Field · Stationary

When you need special information—consult READERS' SERVICE DEPT. *on pages 85-89.*

TANDEM DRIVE MOTOR GRADER

only **$3,585**

F.O.B. Springfield, Ill. Taxes, attachments and export preparation extra. Price subject to change without notice.

here's a value that invites comparison

Compare **THE PRICE!**
Compare **THE FEATURES!**
Compare **THE PERFORMANCE!**

...and you will agree
THE ALLIS-CHALMERS MODEL D IS YOUR BEST BUY... BY A LONG WAY

FOR SOME JOBS On All Projects
FOR ALL JOBS On Some Projects

ALLIS-CHALMERS MODEL D

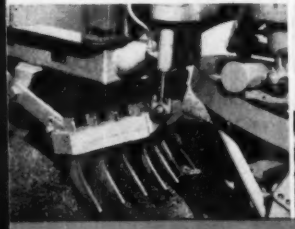
WEIGHT—8,590 lb. (base)
BRAKE HP.—34.7 (famous Allis-Chalmers gasoline engine)
SPEEDS — four forward, 2.40 to 18.61 mph.; reverse to 3.9

Not a converted job...it's ENGINEERED NEW FROM THE GROUND UP—to bring you BIG grader design and performance advantages

- **TANDEM DRIVE**
- **TUBULAR FRAME**
- **ROLL-AWAY MOLDBOARD**
- **POWER HYDRAULIC CONTROLS**
- **COMPLETE OPERATOR COMFORT**
- **REAR ENGINE DESIGN**
- **HIGH ARCH-TYPE FRONT AXLE**
- **DROP DOWN TRANSMISSION**
- **FULL VISIBILITY**
- **SIMPLIFIED SERVICING**

. . . Plus special attachments that widen its usefulness—Rear-End Loader, Scarifier, Windrow Eliminator, "V" or Blade-Type Snowplows. Also, various other accessories. Electric starter and lights standard equipment

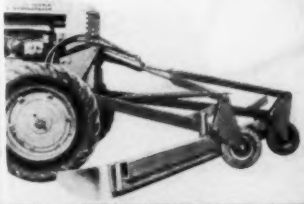
HYDRAULICALLY CONTROLLED SCARIFIER — Located back of circle for greater down pressure. Fast, accurate ripping, controlled penetration. Easy, positive steering resulting from greater front-end stability.



LOADS MATERIAL into trucks with Tractomotive Loader — from windrows and stockpiles . . . surplus dirt or snow. Hydraulically operated, simple to mount ⅝ cu. yd. bucket. Bucket teeth available.

PLOWS SNOW with specially designed Baker snowplows — "V" or Blade-Type. Hydraulically controlled. Interchangeable blade plow may be used for backfilling and light 'dozer work.

WINDROW ELIMINATOR SAVES TIME. This rear blade saves extra pass by feathering out windrow from grader blade. Means safer traffic conditions, too. Specially designed for the Model D.



ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

for Greater Production... for Easier Operation... for Simplified Servicing

"Seeing is Believing." Ask Your Allis-Chalmers Dealer for a Demonstration.

HYDRO-TITE

WHEN YOU WENT COURTING...

A pair of "Bull Dogs" like these and a three-inch starched collar were standard equipment. Probably a sailor straw with a gaily striped band rounded out the ensemble.

Even back in those days HYDRO-TITE was doing its job of making joints in cast iron water mains that were being laid away for keeps.

Styles have changed but HYDRO-TITE is still doing its job. Those joints are right there serving you twenty-four hours a day.

HYDRO-TITE is still made in powder form packed in 100-lb. moisture-proof bags, and now is obtainable also in "LITTLE-PIG" solid form in 50-lb. cartons.

Let HYDRO-TITE go to work for you.

HYDRO-TITE AND FIBREX IN STOCK IN

Portland, Oregon
Kansas City, Mo.
Birmingham, Ala.
Little Falls, N. J.
Seattle, Wash.
Memphis, Tenn.
Orlando, Fla.
Boston, Mass.

HYDRAULIC DEVELOPMENT CORP.

MAIN SALES OFFICE **50 CHURCH ST., N. Y. C.**

General offices and works **W. Medford Sta., Boston, Mass.**

Let's look at the record!

UNITED STATES: Akron, O.; Alexandria, Va.; Alton, Ill.; Ann Arbor, Mich.; Austin, Tex.; Baltimore, Md.; Bedford Park, Ill.; Brownsville, Tex.; Chattanooga, Tenn.; Chester, Pa.; Chicopee, Mass.; Chicopee Valley; Cleveland, O.; Dallas, Tex.; Davenport, Ia.; Denver, Col.; Des Moines, Ia.; Detroit, Mich.; East Denver, Col.; East St. Louis, Ill.; Edge Moor, Del.; Enid, Okla.; Evanston, Ill.; Flint, Mich.; Georgetown, D. C.; Greensburg, Pa.; Handley, Tex.; Hot Springs, Ark.; Hyde Park, Mass.; Johnsonville, Tenn.; Kansas City, Kans.; Long Branch, N. J.; Lorton, Va.; Louisville, Ky.; Mansfield, O.; Minnequa, Col.; Mobile, Ala.; Monroe, Mich.; Morgantown, W. Va.; Norfolk, Va.; North Denver, Col.; Oklahoma City, Okla.; Oxford, Pa.; Portland, Me.; Portville, N. Y.; Rochester, N. Y.; Sewaren, N. J.; Shreveport, La.; Stillwater, Okla.; Syracuse, N. Y.; Tampa, Fla.; Trenton, N. J.; Trenton, Mich.; Tulsa, Okla.; Utica, N. Y.; Washington, D. C.; Waterbury, Conn.; Wayne County, Mich.; West Palm Beach, Fla.; W. Tulsa, Okla.; Williamsburg, Va.; Winston-Salem, N. C.; Wooster, O.; Wyandotte, Mich.
DOMINICAN REPUBLIC: Barahona, Cotarey, Ciudad Trujillo, Elias Piña, San José de Ocoa, San Juan de la Maguana.
SOUTH AMERICA: Caracas, Venezuela; Guayaquil, Ecuador; Maracaibo, Venezuela; Rio de Janeiro, Brazil; Valencia, Venezuela
TAKE 1949 . . . .
FOR EXAMPLE

In 1949, Lock Joint Pipe Company supplied or contracted to supply reinforced concrete pressure pipe in 75 cities and towns throughout the western hemisphere. Completion of these contracts requires production of the equivalent of more than 75,000,000 inch diameter feet of pipe varying in size from 12" to 120" and designed for pressures varying from a minimum to better than 200 pounds per square inch.

In 1949, Lock Joint Pipe Company provided pressure pipe for installations from Portland, Maine, to Rio de Janeiro, Brazil—from Denver, Colorado, to Ciudad Trujillo in the Dominican Republic. And if past performance is any criterion, every installation will produce another "satisfied customer."

We will gladly refer you to any or all of the many federal agencies, state or county authorities, private water supply companies and industrial concerns which have installed Lock Joint Pressure Pipe during the last forty years. We are confident that their testimony will prove to be Lock Joint's best salesman.

For over forty years Lock Joint has specialized exclusively in the production and technical improvement of reinforced concrete pipe for water supply and distribution mains, sewers, storm drains, culverts and subaqueous installations.

LOCK JOINT PIPE COMPANY

Est. 1905

P.O. Box 269, East Orange, N. J.

PRESSURE PIPE PLANTS: Wharton, N. J., Turner, Kan., Detroit, Mich.

BRANCH OFFICES: Casper, Wyo. • Cheyenne, Wyo. • Denver, Col. Kansas City, Mo. • Valley Park, Mo. • Chicago, Ill. • Rock Island, Ill. Wichita, Kan. • Kenilworth, N. J. • Hartford, Conn. • Tucumcari, N. Mex. Oklahoma City, Okla. • Tulsa, Okla. • Hato Rey, Puerto Rico

When writing, we will appreciate your mentioning PUBLIC WORKS

ANNOUNCING THE

LOW COST

St. Paul Pax-all
REFUSE LOADER

The packing unit for any municipal budget

The price of the St. Paul Pax-all is much lower than you would think possible for this packing type refuse collection unit with its many advantages. Another important cost saving is that the Pax-all can be mounted on a lighter GVW chassis. Still a third saving is that installation of the Pax-all costs less. Maintenance and operating costs are lower. Use the coupon . . . get all the facts about the St. Paul Pax-all.

OTHER ADVANTAGES: Exclusive "Cram-Packing" feature means maximum payloads • Low loading height • Easily maneuverable in narrow alleys • Ideal load distribution in transit and dumping • Handles wet garbage and ashes as well as other refuse • Etc.

ST. PAUL DIVISION
GAR WOOD INDUSTRIES, INC.
2207 University Avenue, S.E.
Minneapolis 14, Minnesota

Mail It Today!

ST. PAUL DIVISION
Gar Wood Industries, Inc., 2207 University Avenue S.E.
Minneapolis 14, Minnesota

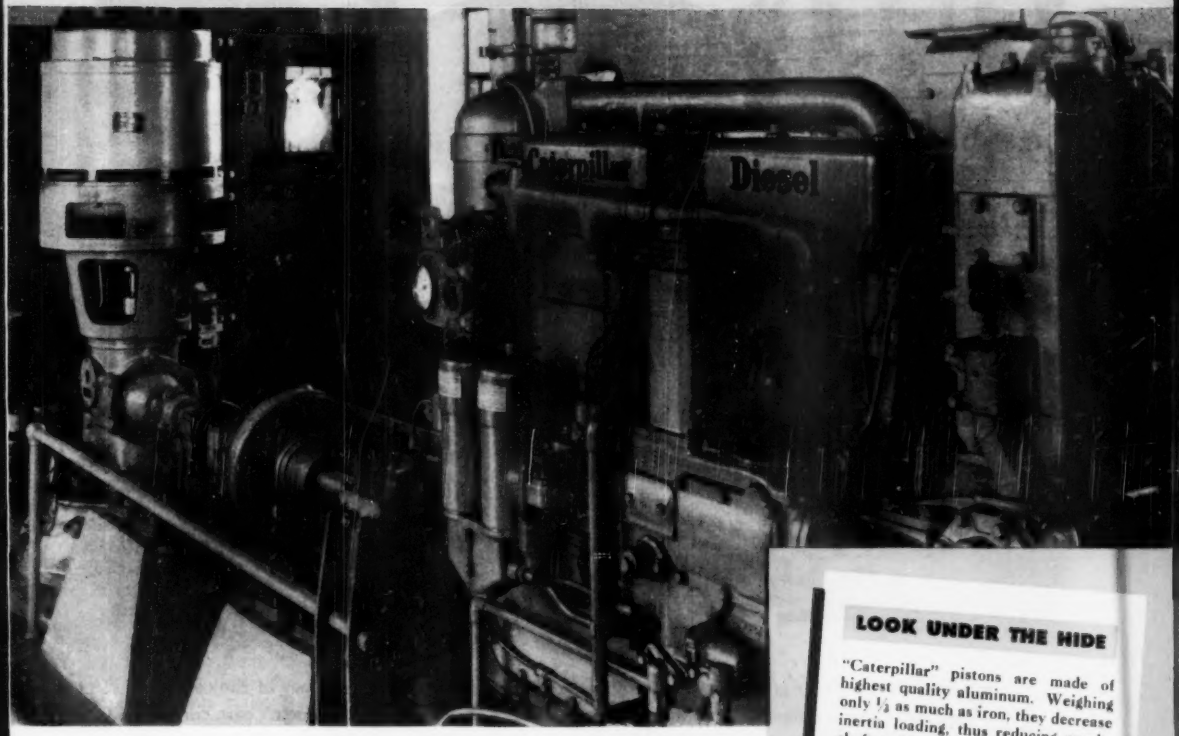
Please send me information on how the low cost St. Paul Pax-all will reduce refuse collection costs.

NAME_____
POSITION_____
ADDRESS_____
CITY_____ ZONE____ STATE_____

When you need special information—consult READERS' SERVICE DEPT. *on pages 85-89.*

Water Insurance

for COLONIE, N. Y.



LOOK UNDER THE HIDE

"Caterpillar" pistons are made of highest quality aluminum. Weighing only ½ as much as iron, they decrease inertia loading, thus reducing crankshaft and bearing fatigue. Pistons are cooled by an oil spray—prolonging piston life and decreasing lubrication breakdown. Rings are made to high-speed aircraft standards. Top rings are chrome-plated—all rings are honed and lapped to offer up to 5 times normal ring and liner life. *Look under the hide for quality and long life—you'll find it in every "Caterpillar" part.*

WHEN you have a "Cat" Diesel standing by, you don't have to worry about your town going dry because of outside power failure. This trouble shooter is ready to go at a moment's notice—and to carry the load as long as necessary. A good example is the D8800 pictured here, owned by Latham Water District, Town of Colonie, Newtonville, N. Y. The commercial power went out on July 17, 1947, and this D8800 immediately took over. It remained in action for the duration—a period of twenty-eight days. Averaging 12 to 13 hours a day, it drove a Layne Bowler deep well turbine pump with Johnson Gear Drive for an output of 525 gpm. from the 161-ft. well.

"Caterpillar" Diesel Engines and Electric Sets are simple to install, easy to operate. They require no special training on the part of the operator. Designed for the rugged jobs, they give long, economical service. Low-cost, non-premium fuels are burned without fouling.

Consider the effect power failures have on your community and its water supply. Ask your "Caterpillar" dealer to show you the advantages of "Cat" power for full-time or stand-by service.

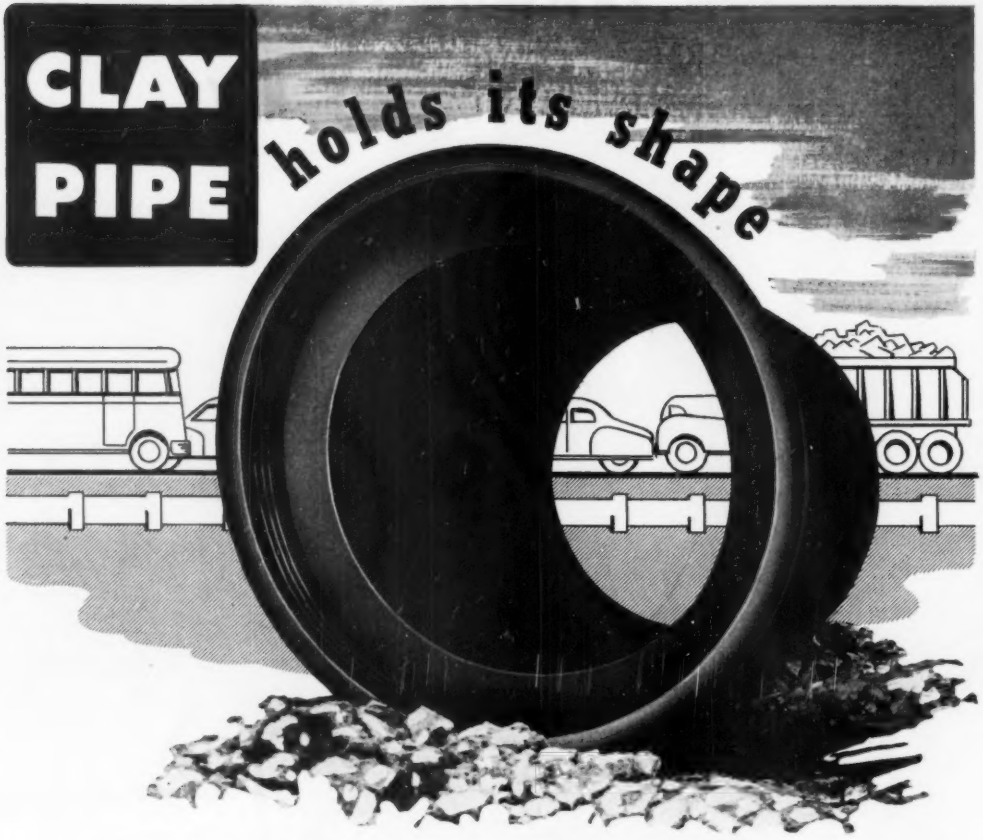
CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES · TRACTORS
MOTOR GRADERS
EARTHMOVING EQUIPMENT

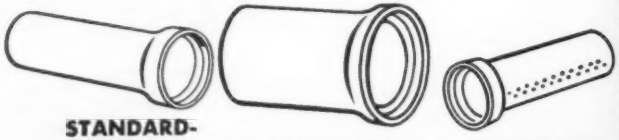
CLAY PIPE holds its shape



VITRIFIED CLAY PIPE is fired *hard* . . . it does not lose shape and flow capacity. Its rigidity keeps it round and smooth under the live or dead loads for which it is rated. Even under high temperatures, Clay Pipe holds its full inside diameter. It won't squash out — can't be cut or chewed by the rotary tools used to remove bulky obstructions from the line. In fact, Clay Pipe can't be affected by *any* of the common causes of sewer failure. It doesn't rust, corrode, melt, crumble, or disintegrate. Its permanent, trouble-free life doesn't depend upon sulphide control devices or the delicate balancing of such factors as sewage temperature, velocities and age of sewage. It's the *only* pipe built to withstand any operating conditions.

NATIONAL CLAY PIPE MANUFACTURERS, INC.
703 Ninth & Hill Bldg., Los Angeles 15, Calif.
100 N. LaSalle St., Rm. 2100, Chicago 2, Ill.
1105 Huntington Bank Bldg., Columbus 15, O.
206 Connally Building, Atlanta 3, Georgia

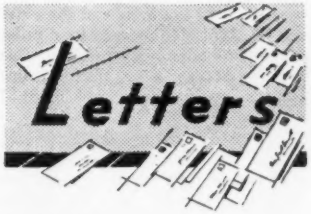
SPECIFY *Vitrified* **CLAY PIPE**



STANDARD-STRENGTH CLAY PIPE | **EXTRA-STRENGTH CLAY PIPE** | **PERFORATED CLAY PIPE**

C-450-6

When you need special information—consult READERS' SERVICE DEPT. *on pages 85-89.*



INDUSTRIAL WASTES

In the March, 1950, PUBLIC WORKS, reference is made to an article on the digestion of combined tannery and sewage sludge, by Messrs. Vrooman and Ehle. We would like to know how we can get a copy of this issue as we have a tannery in our city and wish to learn more about the handling of tannery waste which, at times, is a problem to us. Any information you may be able to supply will be greatly appreciated.

R. H. Koether,
City Manager,
Yoakum, Texas.

(Ed. Note—An extra copy of this article from our files was sent Mr. Koether, and the matter is hereby referred to Pete Wisely for further action).

POINT FOUR PERSONNEL

. . . If Point Four goes through Congress, then, since health is fundamental to economic development, the health program under Point Four must be successful. The only thing that can make it successful will be the realization on the part of public health executives in this country that they must make good men available for the program. They may come to this point of view reluctantly, but I am sure they will come to it. We need good men for this program and we welcome requests for further information from them. I do wish we could have a nice visit and talk over some of these matters.

Louis L. Williams, Jr.,
Chief, Div. of International Health,
Public Health Service,
Washington 25 D. C.

A LETTER TO MR. THORPE

I noticed in the February issue of PUBLIC WORKS that you would like some figures on the cost of flushing and sweeping streets. We do both here and keep a record of operating costs. We have two sweepers, both Austin-Western. The equipment rental on the newer

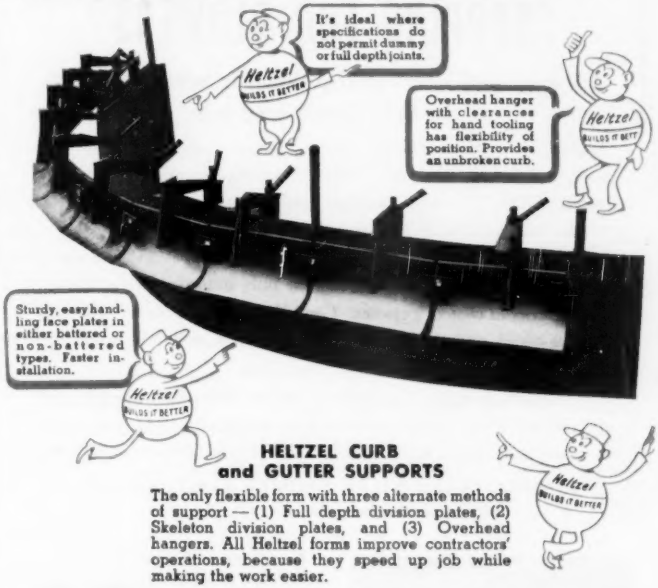
Heltzel BUILDS IT BETTER

HELTZEL

SUPERIOR CURB & GUTTER *Forms*

Demand for Heltzel forms comes from experienced contractors who know Heltzel forms save time and money. TIME — because firmer installations can be made faster. MONEY — because Heltzel equipment lasts longer and involves less labor on the job. The example below of a flexible form is typical of Heltzel better built forms.

- CURB FORMS & ACCESSORIES
- COMBINED CURB & GUTTER
- SIDEWALK FORMS
- RIGID RADIUS FORMS
- FLEXIBLE FORMS
- SPECIAL FORMS


It's ideal where specifications do not permit dummy or full depth joints.
Overhead hanger with clearances for hand tooling has flexibility of position. Provides an unbroken curb.
Sturdy, easy handling face plates in either battered or non-battered types. Faster installation.
Heltzel BUILDS IT BETTER

HELTZEL CURB and GUTTER SUPPORTS

The only flexible form with three alternate methods of support — (1) Full depth division plates, (2) Skeleton division plates, and (3) Overhead hangers. All Heltzel forms improve contractors' operations, because they speed up job while making the work easier.

PUT HELTZEL TO WORK MAKING MONEY FOR YOU

Before you buy, before you start a job — check with Heltzel! Heltzel better built curb and gutter forms in standard types will save for you. Special shapes designed by Heltzel to job specifications make difficult jobs click like run-of-mine work. Write for information now.

HELTZEL STEEL FORM & IRON CO., WARREN, O., U.S.A.

Please send information regarding: G

CURB and GUTTER FORMS _____

ROAD and AIRPORT FORMS _____

BATCHING PLANTS and BINS _____

Firm _____

Address _____

City _____ State _____

H Signed _____

HELTZEL STEEL FORM & IRON CO. WARREN, OHIO · U. S. A.

SHOPPING FOR BLOWERS?

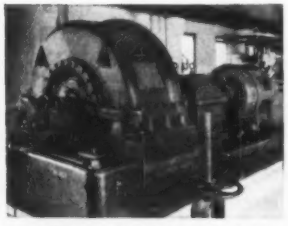
Look at *R-C dual-ability* with its wide selection to suit almost any job

Asking Roots-Connersville about blowers, exhausters and gas pumps has been standard practice among buyers for almost a century. That's because building such equipment is the only job we do. We're outstanding specialists in handling gas and air.

You'll gain from our wide varieties of sizes, types and capacities from 5 cfm to 100,000 cfm. We're the only manufacturers offering you the *dual-choice* between Centrifugal and Rotary Positive designs—and that *dual-ability* is important when it comes to matching the units to the jobs to be done.

So—when shopping, be sure to call on Roots-Connersville, the specialists. When you're interested in vacuum pumps, meters or inert gas generators, we're equally well fitted to fill these needs, too.

ROOTS-CONNERSVILLE BLOWER CORPORATION
505 Poplar Avenue, Connersville, Indiana

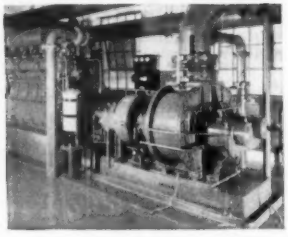


CENTRIFUGAL

Installation of 2-stage Centrifugal Blower in southern sewage treatment plant. Capacity 13,500 cfm.

One of two Rotary Positive Blowers, engine driven, in small sewage treatment plant. Capacity of each, 4,750 cfm.

ROTARY



ROOTS-CONNERSVILLE

BLOWER BUILDERS SINCE 1854

ONE OF THE DRESSER INDUSTRIES

When you need special information—consult READERS' SERVICE DEPT. *on pages 85-89.*

sweeper is $4 per hour and the older one $3. We cover about four miles per hour, which makes the cost $0.75 to $1 per hour, plus the operator's wage which here is $1.37 per hour.

Our flusher is a World War I rig, or was until last summer when we mounted an International motor on the pump. Rental rate on this is $3.25 per hour and the mileage is about the same as the sweepers.

When I went to work for the city of Grand Junction in 1928, we had 17 pieces of equipment; now we have 100. For the past few years we have had an equipment division which rents out the equipment to the working departments. We have a filter plant and a sewage disposal plant, and do our own airport work.

I am sending a copy of this to the Editor of Public Works and would like to show him around if he likes fishing or hunting.

Beryl Delp,
Equipment Supervisor,
City of Grand Junction,
Colorado.

(Ed. Note—Don't tempt the editor too much; he has been known to yield to temptation).

WE LIKE IT TOO

I think your magazine is very good for County Engineers. It meets a need not found elsewhere. I like your articles on pavement bases, sewage disposal, and similar matters.

John A. Chapman,
County Surveyor,
Sulphur, Okla.

MORE ON PW

I have been meaning for some time to write you and congratulate you on the attractiveness of the new format of *Public Works*. I think it is a marked improvement, making your magazine not only easier to read but also pleasanter.

Your editorial on "Better Military Usage of Engineers" was a sound one.

Francis B. Elder,
Engineering Associate,
APHA, New York.

SEWAGE TREATMENT IN S.A.

I have the pleasure of thanking you deeply for the kind and generous authorization for Obras Sanitarias de la Nacion to translate, publish and distribute or sell, free of any charge, the Handbook of Trickling Filter Design, provided credit is given to Public Works Magazine as the source of the articles.

CHECK THESE FACTS... ON DORR CLARIFIER MAINTENANCE COSTS!

REPAIR COSTS ON DORR TYPE S (ROUND) CLARIFIERS

SIZE	PURCHASE PERIOD	YEARS IN SERVICE	NUMBER OF UNITS	REPAIR COSTS		REPAIR COST AS % OF ORIGINAL COST
				TOTAL	PER UNIT	
100'-200' Dia.	1931-42	4-15	115	$3,568	$31	0.27
Under 100' Dia.	1932-33	13-14	30	812	27	1.00
Under 100' Dia.	1934-35	11-12	65	2,121	33	0.71

A glance at the figures above will tell you exactly what repair costs can be expected with Dorr Clarifiers.

These figures are substantiated facts . . . not estimates, guesswork or wishful thinking. We believe they cannot be matched.

Repair costs are one of the primary factors upon which Clarifier excellence should be judged. Are you getting the best?

Sixteen Dorr Sifeed Clarifiers at Easterly Treatment Plant, Cleveland, Ohio, installed in 1932.

We'd like to tell you how Dorr Clarifiers stack up on performance, too. Ask a Dorr engineer for the facts.

DORRCO

THE DORR COMPANY, ENGINEERS
BARRY PLACE, STAMFORD, CONN.

NEW YORK • ATLANTA • TORONTO
CHICAGO • DENVER • LOS ANGELES
RESEARCH AND TESTING LABORATORIES
WESTPORT, CONN.

SUGAR PROCESSING
PETREE & DORR DIVISION, STAMFORD, CONN.

ASSOCIATES AND REPRESENTATIVES
Dorr Technical Services and Equipment Are Also Available Through Associated Companies and Representatives in the Principal Cities of the World. Names and Addresses on Request.

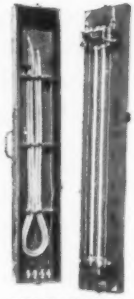
DORR

RESEARCH ENGINEERING EQUIPMENT

HOW TO CHECK WATER WASTE AND LEAKAGE

with Simplex Pitot Equipment

MLC RECORDER



MAC MANOMETER

PF PITOT ROD

Here is an easy solution to the problems of harassed municipal engineers who are constantly seeking ways of detecting leaking pipe joints or pipe breaks . . . to conserve precious water supplies and prevent wastes. The Simplex pitot rod, manometer, and recorder form an unbeatable team for checking water wastes and measurement of flow through pipe lines in inaccessible places or where permanent measuring equipment is not installed.

Each unit is completely portable, light in weight, rugged in construction and designed to withstand the hard treatment of being moved from station to station. By using this equipment, complete and accurate flow records through branches or trunk mains are obtainable with minimum effort.

Write for free Bulletin #50 describing this equipment, to Simplex Valve & Meter Company, Dept. 5, 6750 Upland Street, Philadelphia 42, Pa.

SIMPLEX

VALVE AND METER COMPANY

When you need special information—consult READERS' SERVICE DEPT. *on pages 85-89.*

Also, I wish to thank you for your offer to make other engineering data available to our professional men, and the permission to translate and publish other publications of yours. Please accept our utmost thanks and our heartiest appreciation.

Ing. Edmundo R. Gellon,
Subdirector Principal,
Obras Sanitarias de la Nacion,
Buenos Aires.

BOOKS IN BRIEF

NOMOGRAM INDEX

The nomograms in this book cover a wide range of fields: Chemistry, mathematics, physics, electricity, hydraulics, power, aeronautics, water supply, sewerage, heating, painting, building, surveying, and many others. In all, this book gives the location and content of 1,700 such diagrams published in technical journals. John Wiley & Sons, Inc., New York. $4.

HYDROLOGY

In this book, 24 experts have contributed their knowledge of hydrological problems under the direction of O. E. Meinzer. It covers distribution of rainfall, effects of wind and heat, water table fluctuations, soil moisture, flood control and related factors. 712 pages, 165 illustrations, 23 tables; Dover Publications, Inc., 1780 Broadway, New York, $4.95.

HRB INDEX

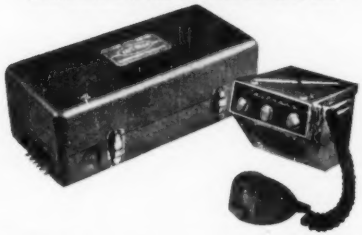
This is an index of the publications of the Highway Research Board. It covers 1,285 individual items. There is a subject index with all papers and reports listed alphabetically; and an alphabetical author index. 147 pages. Highway Research Board, 2101 Constitution Ave., Washington 25, D. C. No prices given; may be free.

TRACTOR SERVICE

A new 287-page service manual on Allis-Chalmers HD-19 torque converter equipped crawler tractor is a complete guide on proper operation, maintenance and repair, including diagnosing troubles. $5. Allis-Chalmers Mfg. Co., Tractor Division, Service Dept., Box 512, Milwaukee 2, Wisc.

NEW RAYTHEON TWO-WAY RADIOPHONE

MODEL UM 30
(30 WATT)
Mobile
RADIOPHONE



- **Requires less space — easier to install.**
- **Lowest battery drain — no special batteries or generators required.**
- **Meets all new F. C. C. requirements including adjacent channel operation and modulation limiting (deviation control).**
- **Available in both single and dual channel models covering the entire 152-174 mc. frequency range.**

Compact. Transmitter-receiver unit only 5" x 6¾" x 15" — installs anywhere in cab or trunk corner.

Low Drain. Requires only 29.5 amps. transmit: 10 amps. operate: 7 amps. standby (receiver only).

Clear Reception. Unit containing speaker, control and power supply is mounted under dash for best acoustical performance and accessibility of controls. This unit incorporates an improved variable squelch control which automatically adjusts itself to prevailing signal and noise conditions.

Easy Installation. Mountings easily installed — or use existing fittings. Covers of both units hinged and latched for quick access.

All Accessories. Furnished complete with car top antenna, military-type microphone with Koiled Kord or telephone hand set, mounting hardware, cables, connectors, etc.

MODEL US 60
(60 WATT)
Base Station
EQUIPMENT

with desk-type control console

The ultimate in 60 watt fixed station equipment. Meets the exacting requirements of industrial, commercial and governmental users. The handsome broadcast-studio-type desk console provides every desirable feature of a fixed station control unit (electric clock, complete metering, etc.)† Designed throughout for maximum convenience, efficiency, ease of operation and simplified servicing. The US 30 — 30 watt base station system, is also available. †Other types of fixed station mounting arrangements are available.

LOOK TO RAYTHEON

For Complete EQUIPMENT

The Raytheon line includes a complete selection of high-performance, easy-to-operate 25-50 and 152-174mc. mobile and fixed station two-way radiophone equipment. Also complete accessory equipment: remote control units, monitoring receivers, receiver selectors, high gain central station antennas, coaxial cables, fittings and test equipment including frequency monitors.

For Complete SERVICE

The entire Raytheon team of Engineering . . . District Sales and Field Service, including our Washington office . . . plus 200 independent sales-service organizations, is ready to serve you with technical help in planning and selecting equipment, filing FCC application and obtaining utmost service and satisfaction from Raytheon equipment.

RAYTHEON

Excellence in Electronics

RAYTHEON
MANUFACTURING COMPANY
WALTHAM, MASSACHUSETTS

Sold Exclusively in Canada by Canadian Marconi Co., Marconi Bldg., St. Sacrament St., Montreal

Export Sales and Service: Raytheon International, 50 Broadway, New York 4, N. Y.

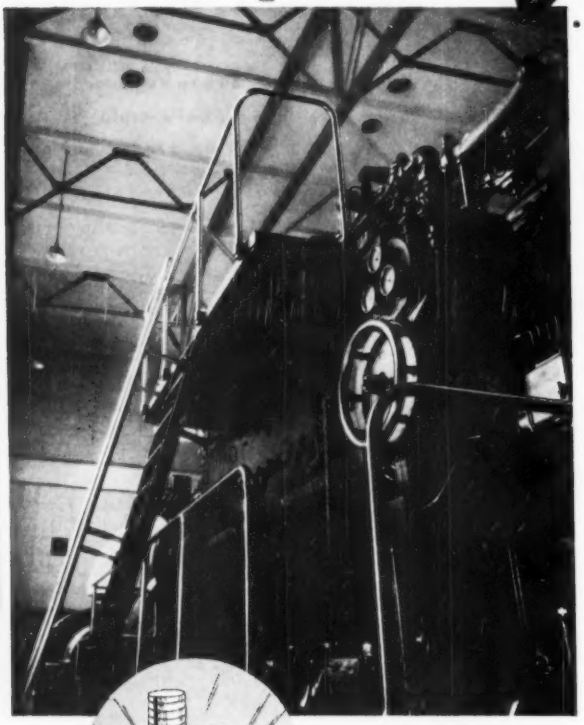
MAIL THIS COUPON TODAY!

Dept. 6460PW
Raytheon Manufacturing Co.
Waltham 54, Massachusetts
Please send complete information on Raytheon Two-Way Radiophone:
Model UM 30 (30 watt) Mobile Unit
Model US 30 (30 watt) Base Station Equipment
Model US 60 (60 watt) Base Station Equipment

NAME .....
ORGANIZATION .....
ADDRESS .....
CITY ..... ZONE ..... STATE .....

How New York got new ideas about sewage plant economy

. . . *from this first dual fuel engine in the U. S.* . . . *a* WORTHINGTON!



Always a leader in sewage plant development, New York City has long been an important Worthington customer. Since 1937, the metropolis has installed 17 Worthington engines, ranging from 300 hp to 1440 hp and totalling 11,560 hp, at disposal plants in Tallman's Island, Coney Island and Jamaica.

Among these engines there's a top-ranking candidate for the Hall of Fame. Installed in 1939, it is one of eight Worthington engines at Tallman's Island, driving blowers and sewage pumps. In 1944, this unit was converted from straight gas operation — *becoming the first commercial dual fuel engine installation in the country!*

A NEW ERA IN PLANT ECONOMY

So successful was this trail-blazer in reducing power costs for New York City, that the entire engine situation in America was vitally affected, for communities everywhere were quick to take advantage of this Worthington-pioneered development.

The Worthington engine, using either oil or gas makes it possible to utilize whichever fuel is available or most economical, without stopping the engine. Learn how this and many other cost-cutting features prove *there's more worth in Worthington.* Write to *Worthington Pump and Machinery Corporation, Engine Division, Buffalo, New York.*

WORTHINGTON

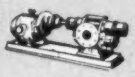
E9-4

YOUR PARTNER IN POWER PROGRESS

Diesel engines, 150 to 3,520 hp . . . gas engines, 175 to 3,520 hp . . . dual fuel engines, 225 to 3,290 hp.

WORTHINGTON-BUILT AUXILIARIES

Balanced Angle Compressors

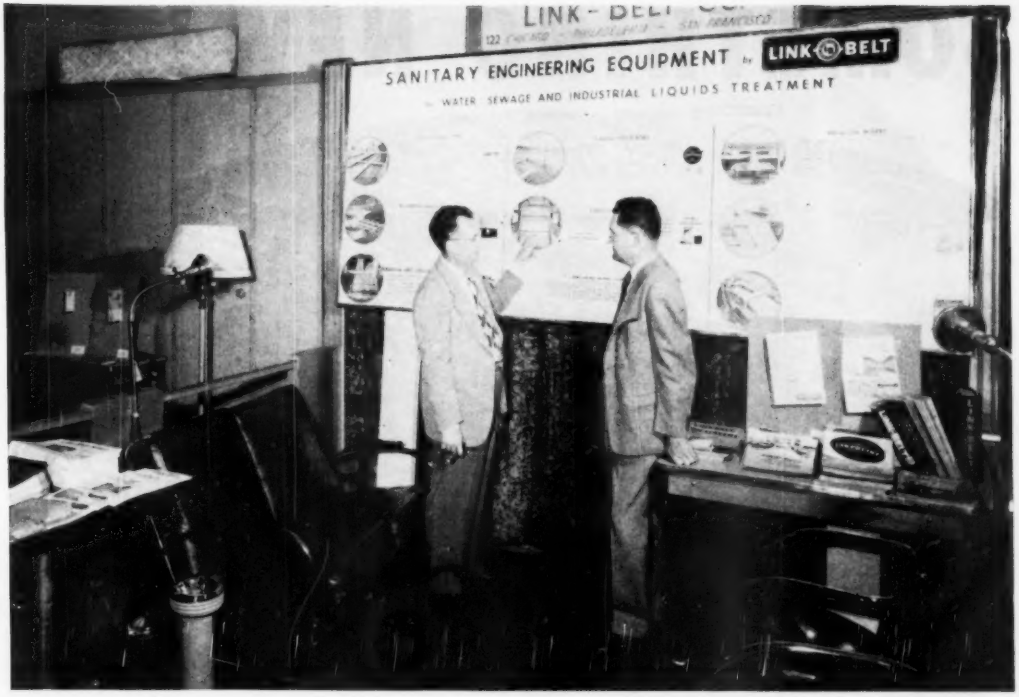


Oil Transfer Pumps

Cooling Water Circulating Pumps

Evaporative Type Engine Water Cooler

When you need special information—consult READERS' SERVICE DEPT. on pages 85-89.



YOU are Invited to Visit

Our Exhibit at the

American Water Works Convention

LINK-BELT Booths Nos. 125 and 127 —

A.W.W.A. Convention, Philadelphia, May 21-26

At this year's convention, our exhibit will feature our sanitary engineering equipment for water treatment plants. Three large treatment plants will be featured. The Nottingham Plant at Cleveland, Ohio with its flash mixers and slow mixers; the Queen Lane Plant at Philadelphia, Pa., which is constructing a pre-treatment plant with Link-Belt flash mixers, slow mixers for flocculation and settling tanks equipped with L-B Straightline Sludge Collectors. At the expansion of the Metropolitan Water District of Southern California, Los Angeles, Calif., treatment plant, Link-Belt equipment was chosen because of its efficiency.

Another part of the exhibit will cover Link-Belt power transmission machinery.

The entire exhibit has been designed to give you valuable knowledge and expert advice on all of these subjects. We sincerely hope you will plan to visit with us.

LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices in Principal Cities.

When writing, we will appreciate your mentioning PUBLIC WORKS

SOMETHING NEW!

Photographs courtesy Levitt and Sons, Inc., Manhasset, N.Y.

N.Y.'S LEVITTOWN TAKES A BOLD STEP FORWARD IN COMMUNITY DESIGN

The marvel of LEVITTOWN goes beyond the statistics of "big builders management" or large scale purchasing and production techniques . . . even beyond the phenomenal output of 4,000 low cost homes per year. Here in LEVITTOWN modern fabrication methods have joined with a vision of community planning to create a higher standard of living for 32,000 men, women and children.

Outstanding among LEVITTOWN'S recreational facilities are 8 large public swimming pools. Each pool is maintained continuously pure and fresh by three Roberts' horizontal pressure filters which are equipped to recirculate and cleanse the 400,000 gallon volume in a few hours with minimum waste.

Roberts Filter Manufacturing Co. is pleased to contribute its 50 years experience in the water works field to the world's largest community housing project.

- GRAVITY and PRESSURE FILTERS
- FILTRATION PLANT SPECIALTIES
- WATER TREATMENT EQUIPMENT
- RECIRCULATION APPARATUS

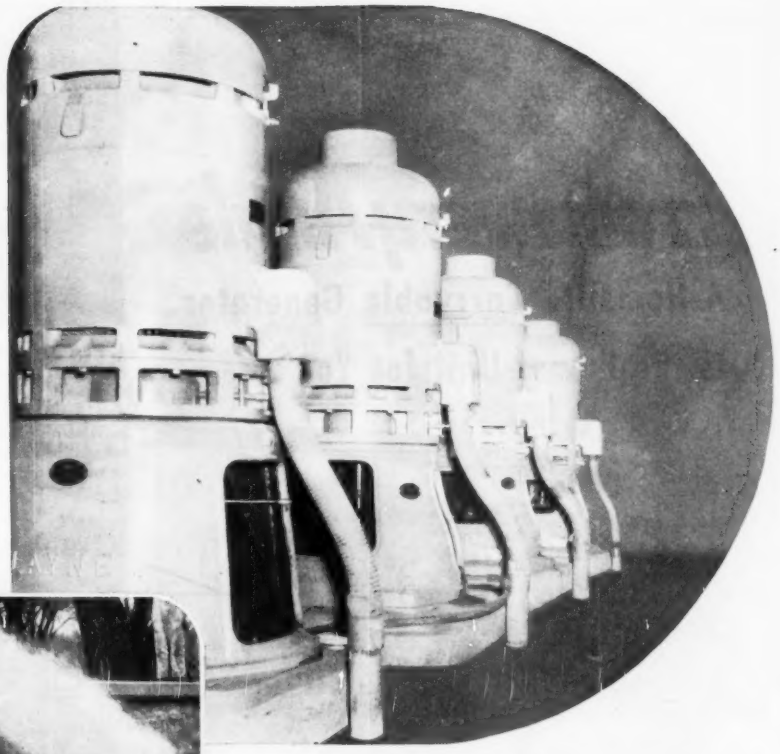
MECHANICAL EQUIPMENT BY ROBERTS FILTER MFG. CO. DARBY, PENNA.

ROBERTS FILTER MANUFACTURING CO.

640 COLUMBIA AVE., DARBY, PA.

When you need special information—consult READERS' SERVICE DEPT. on pages 85-89.

VISIT OUR BOOTHS
NO. 116—118—120
A. W. W. A.
CONVENTION
PHILADELPHIA
MAY 21-26



Just Ask Most Anybody

While there is some chance that we might be prejudiced, our people believe that Layne well water systems are the very finest now being built. However, you can get your facts first hand by doing a little investigating of your own. Just ask most anybody who owns a Layne well water system if he considers them to be okay?—Are they low in upkeep cost—big in volume production—designed right—built of good stuff and then installed and serviced by people who seem to know their business?

We don't know exactly what kind of answers you will get, but according to past records, the "know how" boys,—operating engineers, plant managers, water works superintendents and cost accountants will be mighty, mighty complimentary. They are the first to recognize and show genuine appreciation of good equipment. A list of your nearby Layne well water system owners will be sent on request. For other helpful material —illustrated catalogs and folders, address

LAYNE & BOWLER, INC.
GENERAL OFFICES, MEMPHIS 8, TENN.

LAYNE ASSOCIATED COMPANIES

ASSOCIATED COMPANIES—Layne-Arkansas Co., Stuttgart, Ark. ★ Layne-Atlantic Co., Norfolk, Va. ★ Layne-Central Co., Memphis, Tenn. ★ Layne-Northern Co., Mishawaka, Ind. ★ Layne-Louisiana Co., Lake Charles, La. ★ Louisiana Well Co., Monroe, La. ★ Layne-New York Co., New York City ★ Layne-Northwest Co., Milwaukee, Wis. ★ Layne-Ohio Co., Columbus, Ohio ★ Layne-Pacific, Inc., Seattle, Wash. ★ The Layne-Texas Co., Ltd., Houston, Tex. ★ Layne-Western Co., Kansas City, Mo. ★ Layne-Minnesota Co., Minneapolis, Minn. ★ International Water Corp., Pittsburgh, Pa. ★ International Water Supply, Ltd., London, Ont. ★ Layne-Hispano Americana, S.A., Mexico, D. F. ★ General Filter Company, Ames, Iowa.

LAYNE

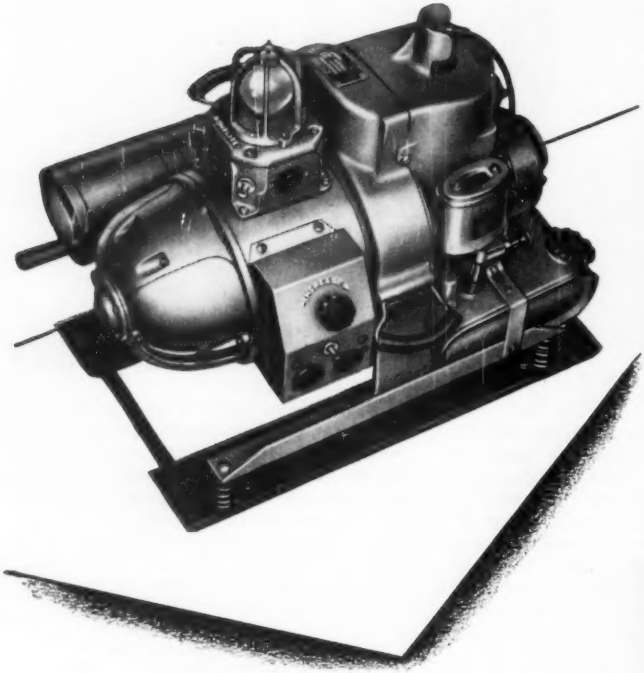
WELL WATER SYSTEMS

VERTICAL TURBINE PUMPS

When writing, we will appreciate your mentioning PUBLIC WORKS

From Every Angle

A Homelite Carryable Generator Is the Power Unit for You...



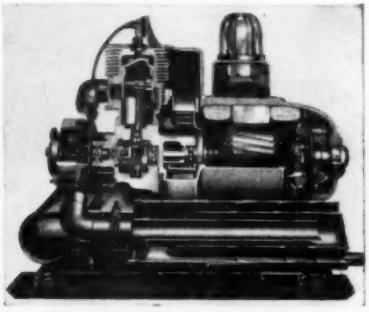
STICK TO THE RULE OF THREE 1. Performance 2. Dependability 3. Service, and you'll always stick to a Homelite.

DEPENDABILITY PERFORMANCE SERVICE

Homelite Corporation

2105 RIVERDALE AVENUE, PORT CHESTER, NEW YORK

1. *PERFORMANCE.* Once you begin to use a Homelite . . . yes, even when you see it demonstrated . . . you immediately appreciate its outstanding performance. Light enough for one man to carry, a Homelite packs the power needed to keep hand tools running at full productive capacity . . . and floodlights burning at full brightness . . . at any time at any place in all kinds of weather.

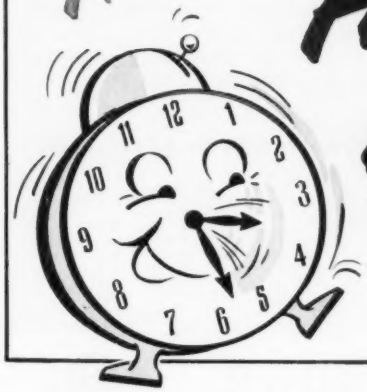


2. *DEPENDABILITY.* Every Homelite Generator though light in weight is a *heavy duty* unit. No baby stuff about it. For more than a quarter century Homelite engineers have specialized in building carryable gasoline engine units . . . close to three hundred thousand of them . . . and they know that to keep a generator going on the job they have to use the finest materials and apply the highest engineering skill.

3. *SERVICE.* Like all pieces of machinery, a Homelite Generator needs, in the long run, a certain amount of servicing . . . a minimum to be sure. But the availability of Homelite service by nationwide exclusive service shops . . . completely stocked and manned by experts who can service your Homelite *right at your door* . . . makes a whale of a difference when it comes to having a generator that will give you instant power not only where you want it, but also when you want it.

When you need special information—consult READERS' SERVICE DEPT. *on pages 85-89.*

FASTER! FASTER! FASTER!



The Permutit® Spiractor®—last word in Cold Lime Soda Treatment—softens water in EIGHT MINUTES!

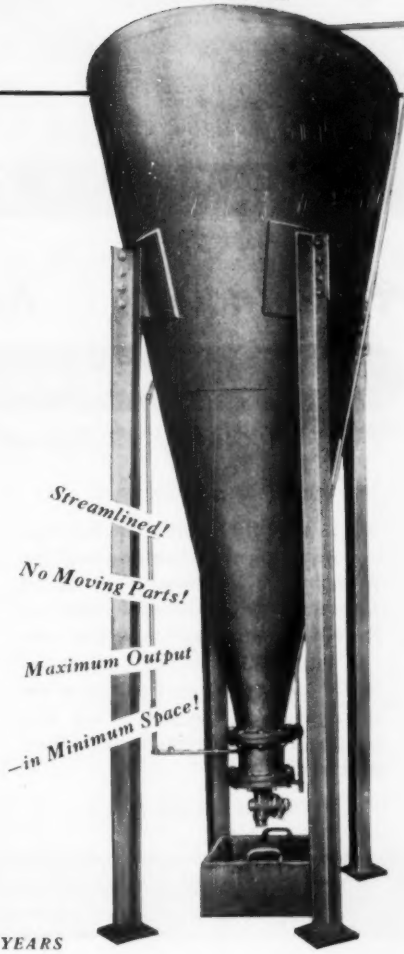
The Spiractor softens water up to 20 times faster than previous cold lime soda methods. That means you can cut your space requirements to a minimum!

Operation of the Spiractor is simple and sure: Hard water and the required lime enter at the base of the cone at a flow rate strong enough to suspend a catalyst bed of calcium carbonate granules without any carryover. The treated water is given a swirling, upward motion by being admitted tangentially to the cone.

The water softening reaction results in precipitates which are deposited on the catalyst granules by accretion. The enlarged granules are drawn off by a valve at the base.

The effluent is soft water that has a low alkalinity content and is suitable for any desired filtration.

Write for full information to The Permutit Company, Dept. PW5, 330 West 42nd Street, New York 18, N. Y., or to Permutit Company of Canada, Ltd., Montreal.



Permutit

WATER CONDITIONING HEADQUARTERS FOR OVER 36 YEARS

When writing, we will appreciate your mentioning PUBLIC WORKS

Results Count!

TENNESSEE CORPORATION
Ferri-Floc
FERRIC SULPHATE
Atlanta, Georgia

- MORE ECONOMICAL
- EASIER TO HANDLE
- SUPERIOR RESULTS

The use of Ferri-Floc in water supplies has several advantages over other coagulants now in use. Economy of operation is a great factor in the minds of prospective users, but, once used Ferri-Floc immediately shows its ability to produce a higher quality of water at a lower cost.

ADVANTAGES OF FERRI-FLOC

1. Coagulation is effective over a much wider pH range than with alum. Color flocs may be formed in the very acid range, where alum may not be employed. On the other hand, true hydrated ferric oxide flocs may be formed at pH 9-10, or even higher for the removal of turbidity and manganese.
2. The time required for floc formation, conditioning, and settling is in many cases considerably shorter than that required for other coagulants.
3. Filter runs have been markedly increased in several cases.
4. Manganese is successfully removed at pH values above 9.
5. Effluents may be produced which are exceedingly low in both iron and aluminum.
6. Hydrogen sulfide is removed, and taste and odor improved.
7. Ferric floc does not seem to stick to sand grains to form mud balls, and is subject to less "breaking through" on the filters.

FREE BOOKLET — Send card or letter for free booklet on the advantages of Ferri-Floc to Tennessee Corporation, Grant Building, Atlanta, Georgia or Lockland, Ohio.

TENNESSEE CORPORATION
Atlanta, Georgia — Lockland, Ohio

Announcing.. **Another Nichols First**

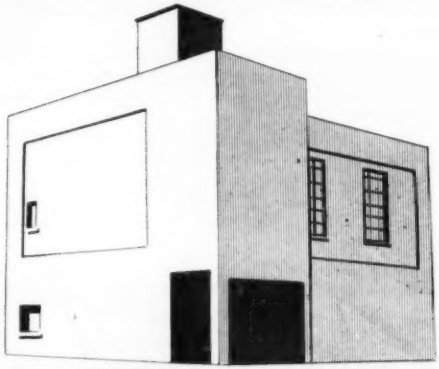
The New Vertical Monohearth Refuse Incinerator

Especially designed for Small Communities

A new thought in refuse incineration —combining the advantages of the Monohearth Mechanically Stoked Incinerator with integral chimney. Result: Astonishingly low first cost . . . big plant efficiency.

Small towns can now have all of the advantages of big city refuse disposal at a total cost well within their budgets.

Write for details, today.



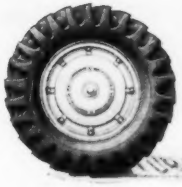
OHIO STATE UNIVERSITY REFUSE INCINERATOR PLANT

NICHOLS ENGINEERING & RESEARCH CORPORATION

70 PINE STREET · NEW YORK 5, N. Y.
40 S. Los Robles Ave., Pasadena 1, Calif. · 1477 Sherbrooke St., W. Montreal 25, Canada

When you need special information—consult READERS' SERVICE DEPT. on pages 85-89.

Broader Shoulders



Built by INTERNATIONAL "Power On Wheels"

Broader shoulders were needed on this country road so that snowplows would have room to dump the winter snows. An International I-4 wheel tractor with a mounted half-yard bucket went to work on the project, rooting out trees, moving dirt and boulders. The I-4 handled from one-half to one mile a day of this work. Later, the tractor dug ditches along the entire road.

Fast, maneuverable International wheel tractors are ideal for hundreds of road and highway maintenance jobs. Easy to handle, economical to operate, all five sizes and seven models of International "Power on Wheels" fit neatly into public works and municipal and county budgets.

Your International Industrial Power Distributor will show you how International crawler and wheel tractors will cut your costs and help keep budgets balanced. See him now about the power and equipment you need for county and municipal maintenance.

INTERNATIONAL HARVESTER COMPANY
Chicago

Tune in James Melton and "Harvest of Stars", NBC. Sunday afternoons.

Standardize on Power that Pays

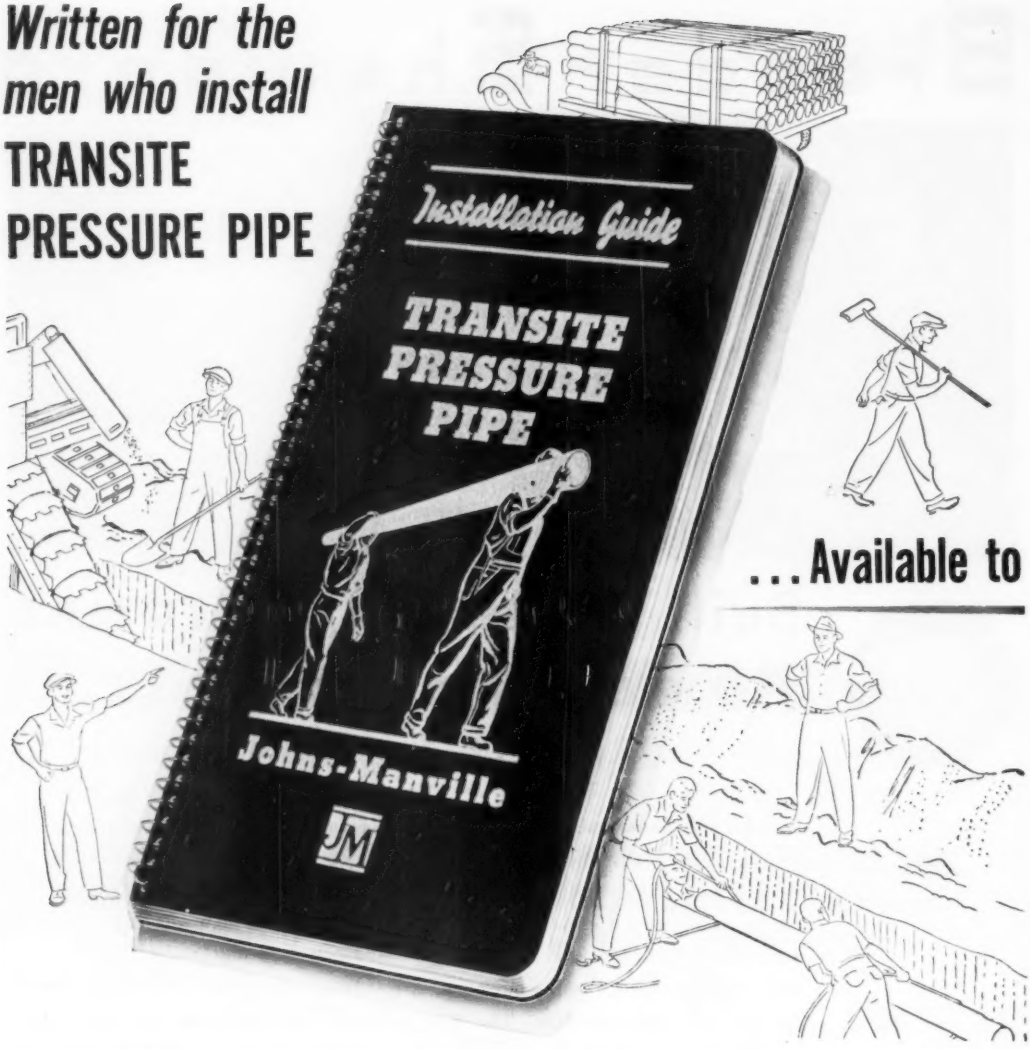
INTERNATIONAL HARVESTER

INTERNATIONAL INDUSTRIAL POWER

CRAWLER TRACTORS • WHEEL TRACTORS • DIESEL ENGINES • POWER UNITS

When writing, we will appreciate your mentioning PUBLIC WORKS

Written for the men who install TRANSITE PRESSURE PIPE



. . . Available to

As its title implies, this new Installation Guide was designed especially for those who do the actual work of installing Transite* Pressure Pipe . . . a handy working tool intended to help the man in the field do a good job in an economical way.

But it answers so many questions of general interest about Transite Pipe that it is being offered, without cost, to anyone concerned with the design, construction or operation of a water system.

Send for your copy today. It will give you a new insight into Transite's many practical features that reduce water line installation costs . . . help answer some of the questions you may have about this Johns-Manville asbestos-cement pipe that is contributing to better and more economical water systems for thousands of American cities and towns.

*TRANSITE is a Johns-Manville registered trade mark

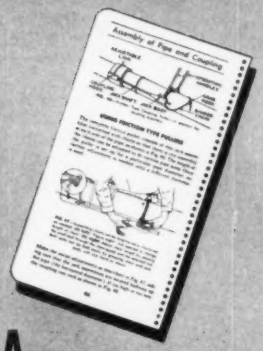
JOHNS-MANVILLE JM PRODUCTS

Johns-Manville TRANSITE

FOR BETTER

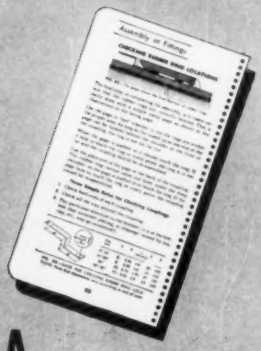
When you need special information—consult READERS' SERVICE DEPT. *on pages 85-89.*

Q. *How is Transite Pipe assembled in the trench?*



A. By means of the Simplex Coupling, a factory-made joint. See page 38.

Q. *How are joints checked for correct assembly in advance of leakage tests?*



A. By the use of a simple feeler gage as described on page 50.

Q. *Are standard practices used for making joints at fittings?*

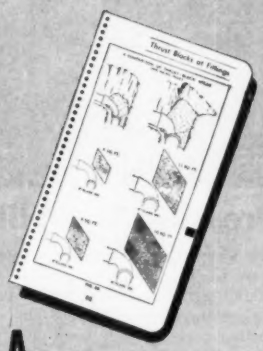
A. Yes—see "Making Joints at Fittings" page 78.

anyone who wants the answers to questions like these

Q. *Can you cut, machine and tap Transite Pipe in the field?*

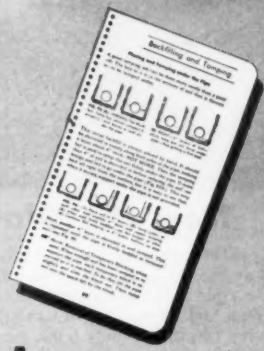
A. Yes—see "Cutting Transite Pipe" page 72 and "Service Connections" page 91.

Q. *How are size and type of thrust blocks at fittings determined?*



A. The Guide gives helpful data, including tables, construction, and location. See page 82.

Q. *What about trench preparation, supporting the pipe, and tamping?*



A. Standard methods are employed. See pages 16, 23 and 97

Just use the coupon—or write to Johns-Manville, Box 290, New York 16, N. Y. In Canada, address 199 Bay Street, Toronto, Ontario.

Johns-Manville
Box 290, New York 16, N. Y.

Please send me the Transite Pipe Installation Guide (TR-62A).

Name_____

Organization_____

Address_____

City_____ State_____

(Key No.)

ASBESTOS-CEMENT PRESSURE PIPE

WATER SERVICE

When writing, we will appreciate your mentioning PUBLIC WORKS

Now the Water Pressure is UNIFORM in Frederick

The maximum pressure variation in the water mains at Frederick, Maryland, was 18 lbs. per sq. in., during a typical 24-hour period before the 1,000,000-gal. Horton tank shown above was added to the system. Now the variation is only 6 lbs. per sq. in. Furthermore, the average pressure in the distribution mains—now about 67-68 lbs. per sq. in.—is higher than it was before the tank was placed in service.

This tank also reduces pumping costs. It is filled during the night with water flowing by gravity pressure from a nearby mountain source. The next day this water is used to meet peak loads. It is not necessary to operate the pumps to fill the tank again. As a result, pumping time is reduced and pumping costs go down. Even if there aren't any hills handy to provide a gravity supply, elevated storage usually reduces pumping costs because the operation of pumps can be spread out into off-peak periods when power rates are lowest.

Horton elevated tanks are available in standard capacities from 5,000 to 3,000,000-gallons. Find out from our nearest office how a good-looking, easily-maintained Horton tank can improve service in your community.

Above: 1,000,000-gal. Horton tank at Frederick, Maryland. It is 105 ft. to bottom and has a range in head of 35 ft. between the upper and lower water levels.

HORTON

STEEL STORAGE TANKS
...for municipal service

CHICAGO BRIDGE & IRON COMPANY

Plants in Birmingham, Chicago, Salt Lake City, and Greenville, Pa.

Atlanta 3	2123 Healey Bldg.	Los Angeles 17	1508 General Petroleum Bldg.
Birmingham 1	1532 North Fiftieth St.	New York 6	3316–165 Broadway Bldg.
Boston 10	1038–201 Devonshire St.	Philadelphia 3	1648-1700 Walnut St. Bldg.
Chicago 4	2115 McCormick Bldg.	Salt Lake City 4	539 West 17th South St.
Cleveland 15	2221 Guildhall Bldg.	San Francisco 11	1225-22 Battery St. Bldg.
Detroit 26	1536 Lafayette Bldg.	Seattle 1	1339 Henry Bldg.
Houston 2	2142 National Standard Bldg.	Tulsa 3	1641 Hunt Bldg.

When you need special information—consult READERS' SERVICE DEPT. *on pages 85-89.*

PUBLIC WORKS MAGAZINE

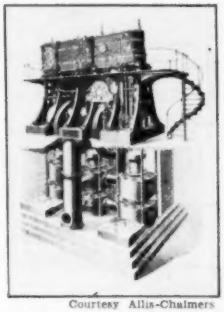
MAY 1950 • VOLUME 81 NO. 5

Courtesy Robert Perry, New London, Conn.

• ***GROTON, CONN., filter plant, designed by Metcalf & Eddy, Boston, Mass. This view shows the filter plant structures as seen from the filtered water reservoir.***

WATER WORKS TODAY AND YESTERDAY

ONCE in a while it is profitable to peer into the past, but the emphasis should always be for the future. So, in this brief pictorial review of some forty years of water works progress, we have stressed the past but slightly. If we have caused a few of our readers to look at the files of the engineering magazines of a bygone day, we have accomplished our aim. It will give the younger men a better background; and it may give the older men a slight nostalgia for other and maybe less hectic days.



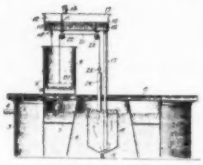
Courtesy Allis-Chalmers

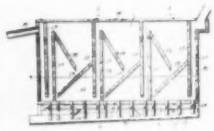
1886 The "Original" triple expansion steam driven pumping engine of E. P. Allis, Milwaukee.

The designs and structures represented here, illustrating the present trends in water works, should help the profession toward even better service to the water works field. Some twenty leading consulting engineers have contributed to this series of pictures; but it has been possible to use only a few of the pictures sent to us. This was regrettable, but necessary, due to the ever-present space limitations that face a publisher. Additional photographs from other engineers, a little late in reaching us, have had to be omitted also. We thank all of these engineers for their interest and their helpful contributions to this brief view of the past and the present. We believe the water works profession should be proud of the plants shown here, not only on account of their appearance, but because of their design and equipment.

Because we believe that the contributions of the manufacturers of equipment and materials for water works have been an essential factor in the improvements of the past forty years, we have, wherever possible, inserted in the legends of the illustrations, a brief statement of the equipment that has gone into each plant. In some cases, space limitations have made it necessary to restrict the descriptive data so that it has been impossible to list all equipment, or to give the full names of the manufacturers. We regret that such omissions have been necessary, for without the professional skills, business abilities, energy and resources of the equipment manufacturers, progress could not have been so rapid, nor could the science have advanced so far. To this part of the water works profession is due much of the credit for our ibility to produce a safe and palatable water.

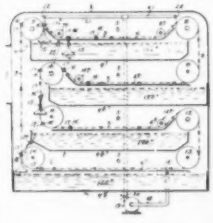
● Water softening apparatus, shown at the right, was patented in 1911 by F. S. Dunham, apparently used a softening chemical in stick form, with a float actuating the feed of the softening chemical.

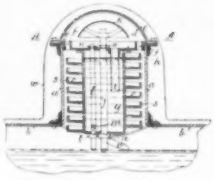




● Water purifier, patented by Edward Bowman and J. A. Wallace, made use of a number of inclined baffles for removing the sediment from the flowing water.

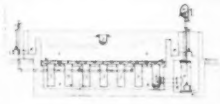
● The automatic water purifier shown at the right was another 1911 product. It contained, in addition to chemical mixing chambers, a purifier and filter through which the liquid passed.

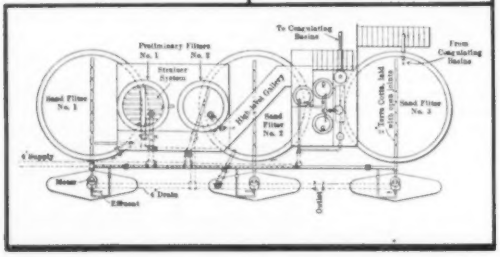




● The water heater and purifier shown at the left was patented by J. E. Wood of England and was described in patent papers in 1911. It included a settling tank and a helical evaporating tray surrounding the tank.

● Reisert's filter, at the right, employed compressed air and clean water for washing, which required one minute.





● Plan of the experimental filters tested in the Washington, D. C., treatment plant in 1910. Bacterial removal was about 97% at rates around 10 mg. per acre per day.

● **Council Bluffs, Iowa,** new water treatment plant, shown at the right, on the opposite page, was designed by Burns & McDonnell Engineering Co., Kansas City, Mo. This project was handled by W. S. Baum. The plant was constructed by Larsen Bros., Council Bluffs, Ia. Chemical conveying equipment was furnished by Dracco Corp., Cleveland; clarifier and basin equipment by the Dorr Co.; chemical feeding equipment by Omega Machine Co.; pumps by DeLaval Steam Turbine Co.; switchgear by Electric Machinery Mfg. Co. of Minneapolis; and the 26th St. feeder main was constructed by Quad City Construction Co., Rock Island, Ill. Frank B. Jensen is superintendent of Water Works of Council Bluffs.

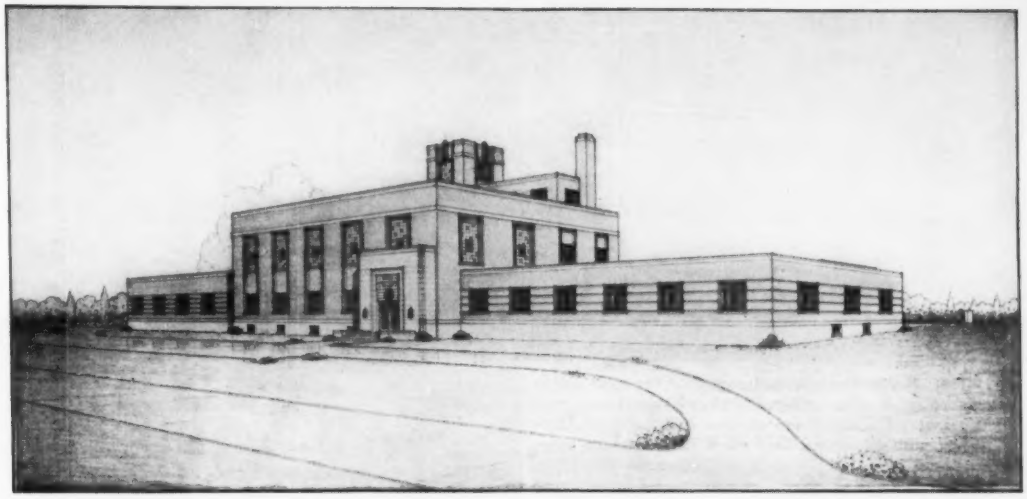
THE A.W.W.A. YESTERDAY

● Nostalgia, here we come! Delegates and guests attending the American Water Works Convention held in Rochester, N. Y., on June, 1911. This photograph was taken at Manitou Beach, on June 7, back when taking a drink of water was some times taking a chance as well. Picture is reproduced from Municipal Journal (ancestor of PUBLIC WORKS) in the issue of June 14, 1911. John W. Alvord was president and John M. Diven, secretary-treasurer. Alexander Milne was elected to succeed Mr. Alvord at this meeting.

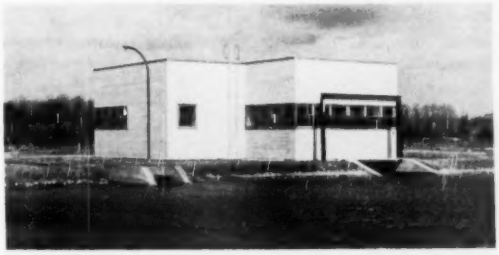
Among the papers were: Wood Stave Pipe, by T. Chalkley Hatton; Theory and Practice of Disinfection of water by the use of Hypochlorite of Lime, by Dr. J. L. Leal; and some Fundamental Considerations in the Determining of a Reasonable Return for Public Hydrant Service, by Leonard Metcalf, in collaboration with Emil Kuichling and W. C. Harvey.

Lighter moments of the convention included an afternoon as thirsty guests of the Bartholomay Brewing Company; and a fish dinner at Manitou Beach, with a special entertainment by the City of Rochester which included a trolley car ride.

For the 1912 meeting place, Louisville, Ky., with *its* Bourbon, won easily over Minneapolis.

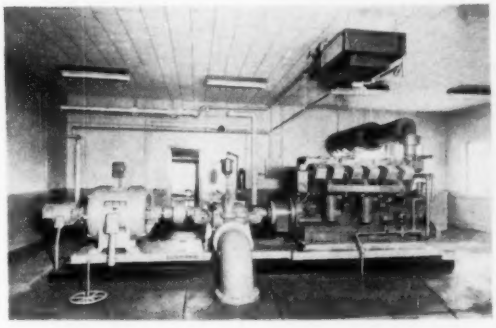


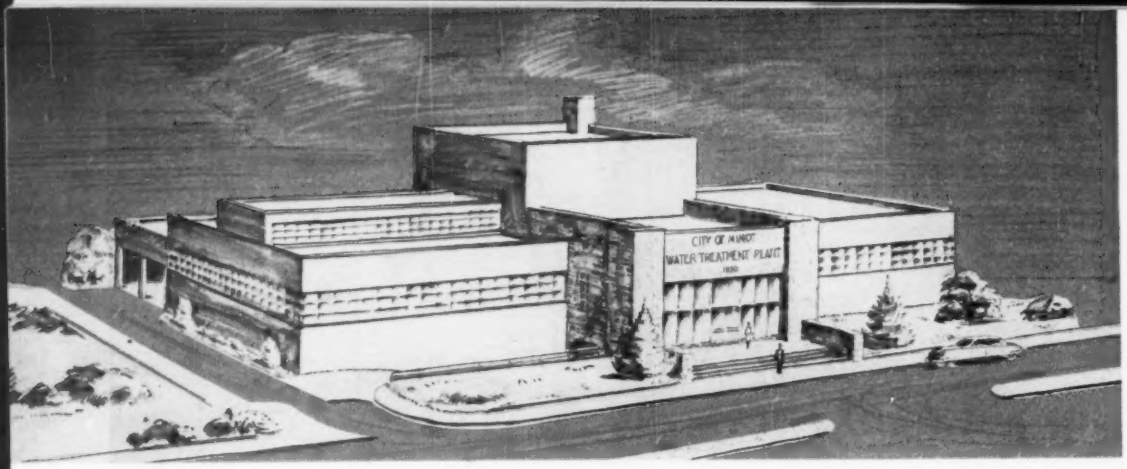
● **Groton, Conn.**, has just begun to operate its new and enlarged filter plant. Designed by Metcalf & Eddy, engineers, of Boston, new construction included a raw water pumping station shown at the right, 3½ miles of 20-in. prestressed supply main, a 4 mgd, addition to the 2 mgd existing filter plant, and a 1.4 mg standpipe. Pumps are furnished by Allis-Chalmers; meters, rate controllers, operating tables, etc., by Builders- Providence; and wash water tank by Chicago Bridge & Iron Company.



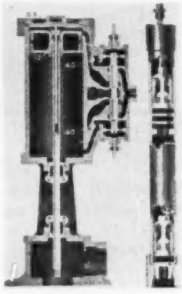
● **Chickasaw Mills** of the Hollingsworth & Whitney Co., has built the plant shown at the left, at Mobile, Ala. Designed by Fay, Spofford & Thorndike of Boston, and constructed by Rust Engrg. Co. of Pittsburgh, it has a capacity of 10 mgd. The project included a pumping station, 18,000 ft. of 36-inch steel pipe line, and the treatment plant. Flash mixer, clarifier and flocculator mechanisms were furnished by Dorr Co.; measuring and control equipment for the filters by Builders-Providence; elevated tank by Chicago Bridge & Iron; and feeders by Omega.

● **Michigan City, Ind.**, plant, shown at the right, was designed by Boyd E. Phelps, Inc., consulting engineer of Michigan City. The installation includes an 8-mgd dual drive gasoline-electric high head service pump. The pump is Allis-Chalmers; the gasoline engine is a Climax 12-cylinder; the motor an A-C. This unit, with a 6-mgd dual driven unit of the same type installed last year, completes the electrification of all of the high and low head pumping. Harry Draves is superintendent.





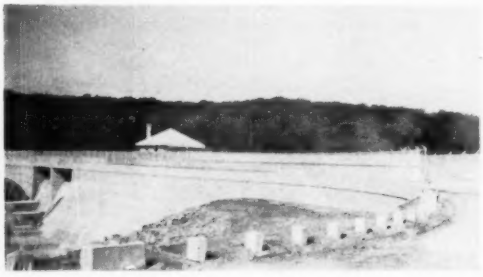
● **Minot, North Dakota,** will complete the new water plant shown in this architect's sketch the latter part of this year. Engineers are Pfeifer & Schultz of Minneapolis, with Sheppard T. Powell of Baltimore, consulting chemical engineer. It will provide softening, iron removal and filtration for a flow of 6 mgd, using either well water or a supply from the Souris River. There are six gravity filters and two chlorinators in addition to the usual low and high pressure pumps, controls, chemical handling and feeding equipment and meters.



1911

● **Deep well** pump and cylinder manufactured by the American Steam Pump Co. of Battle Creek, Mich. These engines were made in eight sizes and were capable of raising as much as 9,400 gals. per hour from a well 80 ft. in depth.

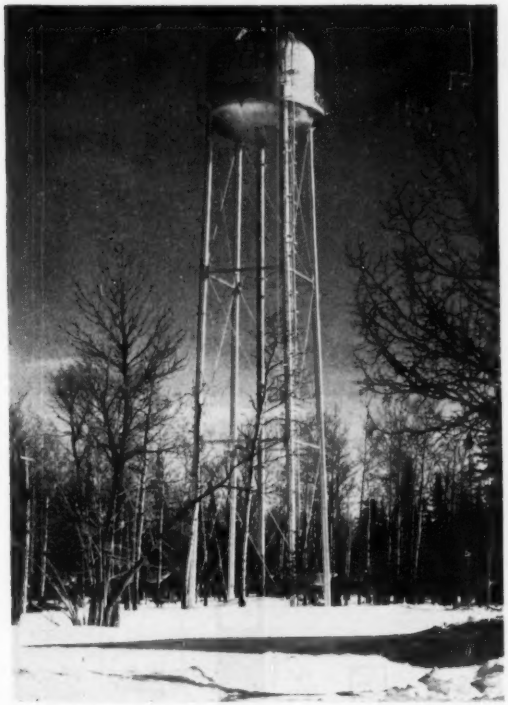
● **Middleville, Mich.,** has added a new concrete storage reservoir designed by Clyde E. Williams & Associates of South Bend, Ind. This view shows the top of the 200,000-gallon ground level concrete reservoir built by Getman Bros.



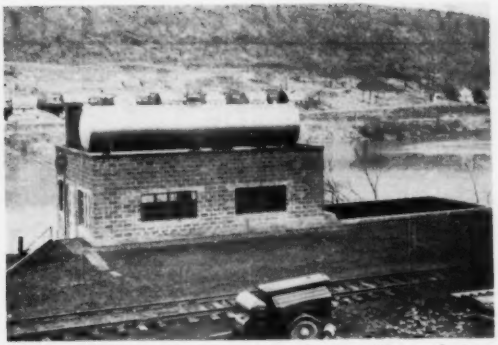
● **Jersey City's** water supply system has been augmented by the Split Rock storage reservoir, designed by Clyde Potts, consulting engineer of New York. This view shows the dam and gate house for this 640-acre lake, with 46′ dam.

● **Port Washington, Wisc.,** has built the new filter plant shown above. Designed by Greeley & Hansen and built by Jos. J. Duffy Co., this plant draws water from Lake Michigan. Capacity is 1.5 million gallons.

● **Battle Creek, Mich.,** has built two water storage tanks from designs of Jones, Henry & Schoonmaker of Toledo. The elevated tank is 200,000 gallons capacity; the low-level reservoir holds 3,800,000 gals.

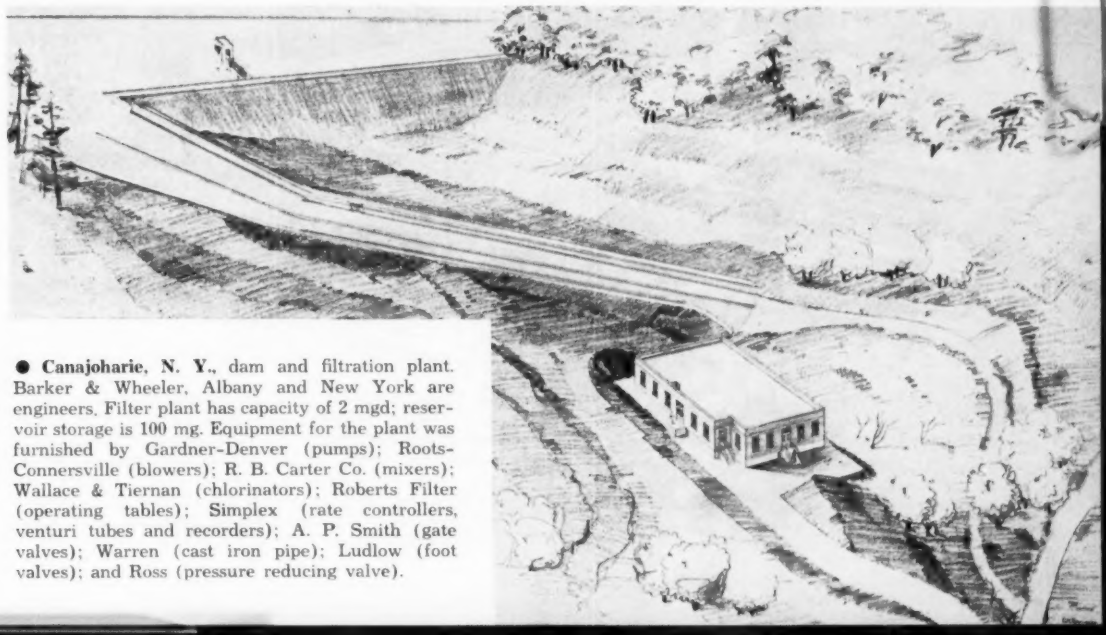


● **Bigfork, Minn.,** water works were designed by Hitchcock & Estabrook, Inc., consulting engineers of Minneapolis. Water is from a well 173 ft. deep; the tank was built by Chicago Bridge & Iron Co.; Fairbanks, Morse furnished a 100-gpm pump; the distribution system includes 12,000 feet of 6-in. cast iron pipe, with Waterous hydrants. Casper-Lyons Co., Grand Rapids, was contractor.

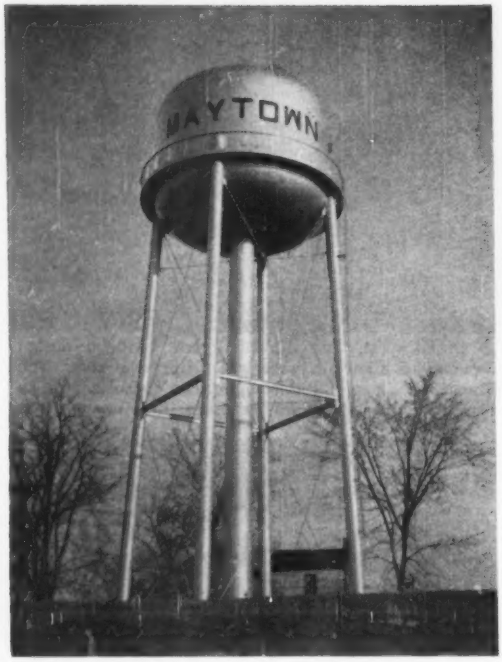


● **Carmichaels, Pa.,** filtration plant, with a design capacity of 0.5 mgd, takes water from the river. The Chester Engineers, Pittsburgh, were consultants. The tank on top of the plant furnishes filter wash water.

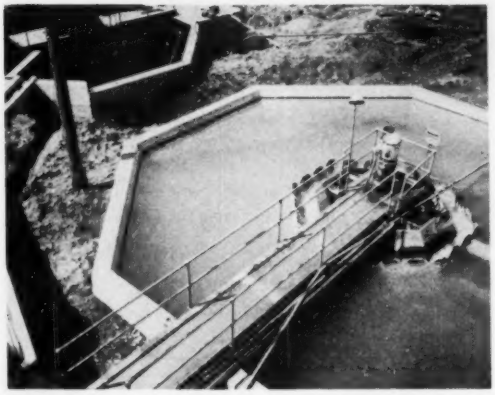
● **Clear Lake, Ia.,** water treatment plant, Stanley Engineering Co., Muscatine, Ia., consultants, provides aeration, break-point chlorination, filtration through anthrafilt and, if desired, activated carbon filters.



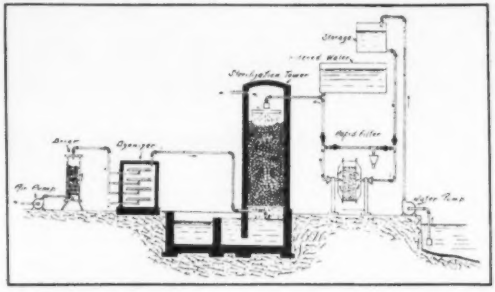
● **Canajoharie, N. Y.,** dam and filtration plant. Barker & Wheeler, Albany and New York are engineers. Filter plant has capacity of 2 mgd; reservoir storage is 100 mg. Equipment for the plant was furnished by Gardner-Denver (pumps); Roots-Connersville (blowers); R. B. Carter Co. (mixers); Wallace & Tiernan (chlorinators); Roberts Filter (operating tables); Simplex (rate controllers, venturi tubes and recorders); A. P. Smith (gate valves); Warren (cast iron pipe); Ludlow (foot valves); and Ross (pressure reducing valve).



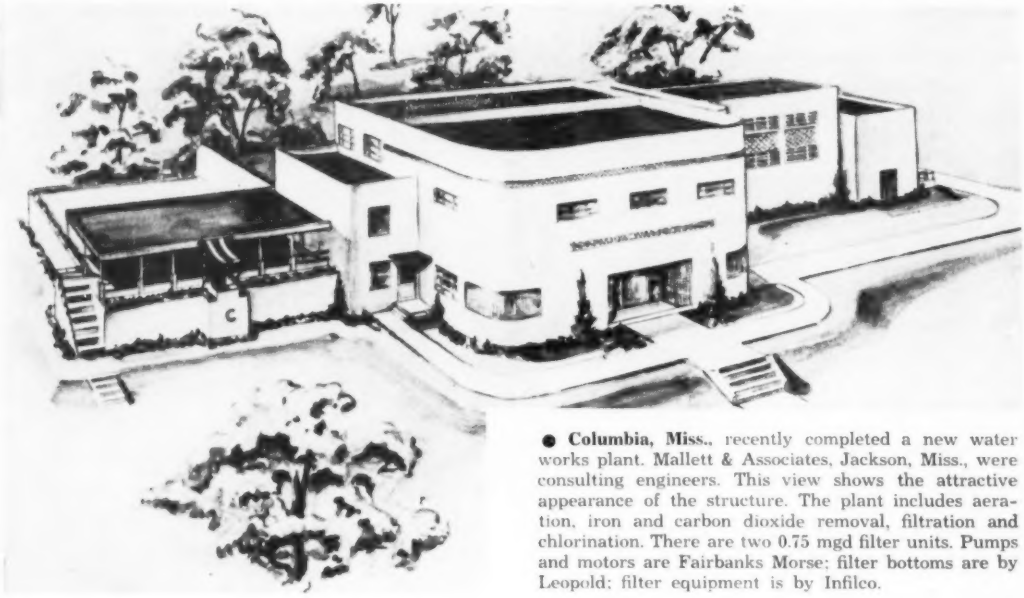
● **Maytown, Pa.,** unincorporated, 600 population, has a modern water plant, financed by municipal authority revenue bonds; cost of plant, $80,000. Capitol Engrg. Co., Dillsburg, Pa., was the engineer, and M. Simon Zook of Honeybrook was contractor. Suppliers included Chicago Bridge & Iron, Proportioneers, Aurora Pump, Mueller and Keasby & Mattison. There are 136 users at the present.



● **Ashland, O.,** has doubled the capacity of its treatment plant from plans by Paul A. Uhlmann & Associates, Columbus. Equipment is by Infilco, Builders and others.



● **Siemen's** layout for sterilizing water by utilizing ozone, as published in 1911. It looks inadequate now.



● **Columbia, Miss.,** recently completed a new water works plant. Mallett & Associates, Jackson, Miss., were consulting engineers. This view shows the attractive appearance of the structure. The plant includes aeration, iron and carbon dioxide removal, filtration and chlorination. There are two 0.75 mgd filter units. Pumps and motors are Fairbanks Morse; filter bottoms are by Leopold; filter equipment is by Infilco.

AQUATIC BIOLOGY AND THE WATER WORKS ENGINEER

JAMES B. LACKEY

AN engineer proposing to use water from the Hudson River to relieve the New York City water shortage should consider beforehand the relationship of that water's characteristics to its intended use. The same would apply to the selection of water from a river for industrial use. In either case, almost inevitably, some one characteristic of the water, or perhaps several of them, would present problems. These might be physical, and in the engineer's own sphere, or chemical, and to be dealt with by a chemist; or biological. If lucky, the engineer could obtain some help on this last problem from a bacteriologist.

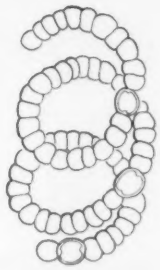
Biological Problems

Of late years, an increasing number of problems, whose basis is biological, has plagued engineers in charge of water supplies. In part this increase has been due to a growing scarcity of water sources which, coupled with the demand for more water, has made it necessary to use supplies having probable undesirable characteristics; and in part it has been due to the increasing load of pollution carried by our streams. For such biological problems the engineer has few sources to which he may refer for help. Not many schools give courses in the biology of water supply; there are only two or three reference books in the field; and the number of pamphlets and professional papers are available is limited. Only a few biologists have had extensive experience in this field and none of the companies manufacturing water works equipment, if the writer's memory is correct, employs a professional biologist.

Broadly, the biological problems inherent in water intended for domestic or industrial use arise from (a) the natural source of the water: or (b) some source of pollution. The first of these means primarily that soft waters from granitic rocks tend to grow certain types of organisms, and these sparingly; and the harder waters from limestone rocks tend to grow other types of organisms, and in greater abundance. In a few cases, the treatment of water after it has been put into use is responsible for biological problems: for example, growths in conditioning and condenser systems.

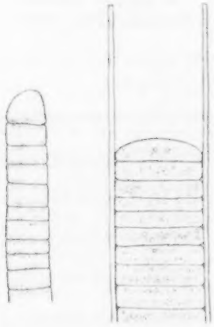
Classification of biological problems must necessarily be on a tentative basis, for new ones are being reported from time to time. Among the most usual problems are tastes and odors due to algae or protozoa. Soft waters tend to develop great accumulations of particular species of a few types which produce nauseous tastes and odors. These accumulations, termed blooms, usually consist of a single species which, within a few days, reaches a high population peak and then declines. These blooms fortunately rarely persist, and usually a given species blooms only once a year. Most of these soft water (ph below 6.8) forms belong to the yellow brown or brown flagellated algae. Some are pictured herewith.

The cause of such blooms are still unknown, despite considerable research; but Sawyer and Lackey were unable to find blooms until nitrate nitrogen (NO_3) and phosphate phosphorus (PO_4) accumulated in natural waters to respective values of



● *Anabaena spiroides*, chain formation detail.

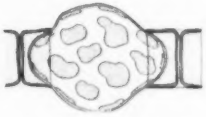
● *Microcystis*, free-blooming and nauseous.



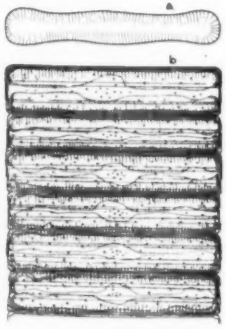
● *Oscillatoria*, left, and Lyngbya at right.

● *Gleotrichia*, chains radiate from a center.

● *Euglena gracilis* favors fertilized water.



● *Melosira varians;* auxospore shown below.



● *Fragellaria,* showing top and side views.

● *Asterionella,* troublesome for taste and odor.

0.30 and 0.015 ppm or higher. These represent threshold values. Any source contributing these materials to a water should warn the engineer to look for possible trouble from biologic growths.

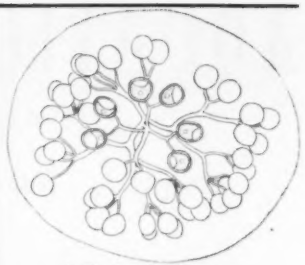
Fertilization

It has lately become common practice to "fertilize" ponds for biologic growths and to increase fish production with commercial fertilizers. Dr. Loosanoff of the Fish and Wildlife Laboratory at Milford, Connecticut, which studies the production of oysters, clams and mussels, raises food for them as a dense soup of green algae by adding commercial fertilizer to water in a large vat. Food requirements are basic for biologic growths; and, after them, temperature, light effects and other factors are important in bloom production.

Natural waters may be subject to heavy increases in fertility from such causes as domestic sewage, industrial wastes, or fertilizer from cultivated or pasture lands.

Water supplies which come from springs, artesian wells or pumped wells usually offer few biological troubles, though springs in limestone regions are always suspect so far as coliform counts are concerned. The other two sources sometimes suffer from iron content or deposits in the pipes. Iron troubles are frequently attributed to iron bacteria, supposedly capable of using ionic iron and converting it to insoluble salts. It should be pointed out that little proof of this can be adduced; that a recent paper by Pringsheim does not support this; and that the bulk of evidence points to such troubles as being chemical or electrical.

Perhaps the best water should be that from a reservoir whose catchment area is heavily wooded and largely uninhabited. Such supplies face trouble from color whose biological basis is the leaf fall from deciduous trees. A watershed whose cover is pine or spruce will accumulate leaf debris at a much slower rate. In either case, the leaf debris is subject to slow biological decomposition and this, plus the nitrates and phosphates contributed by surface runoff, may eventually accumulate fertilizer to a threshold value for algal blooms. There is no escape from at least an occasional bloom in any stored surface water.



● *Dictyosphaerium* can clog filters quickly.

Watershed forests are sometimes subject to heavy insect infestation. Control of such insects (example, spruce budworm) by spraying or dusting should be undertaken with great care. A heavy rain closely following a heavy application of insect killer might possibly contribute dangerously to the water.

Other Sources of Trouble

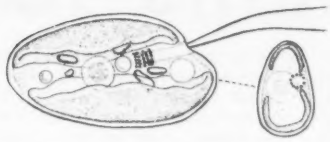
In a soft water reservoir the troubles resulting from heavy biological growths may be taste and odor from *Ceratium, Uroglena, Dinobryon* and *Synura,* but there is little likelihood that these forms will clog filters. Soft water rivers are not apt to be sources of serious trouble, though there are a few diatoms which may cause occasional filter clogging, virtually overnight, or which may cause tastes and odors.

Major troubles occur in hard water streams in densely populated or rich agricultural regions. These streams usually have a heavy plankton content. For a part of the

● *Euglena pisciformis,* found in polluted water.

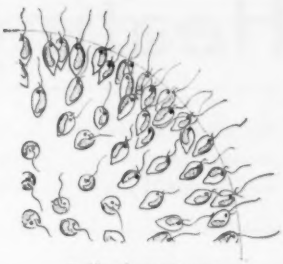
● *Chlamydomonas,* with two flagella.

● *Couteria,* relatively innocuous.



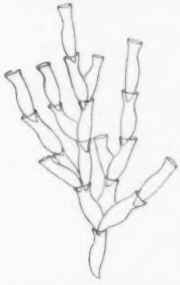
● ***Cryptomonas;* entire animal shown at left.**

● ***Synura* colony.**

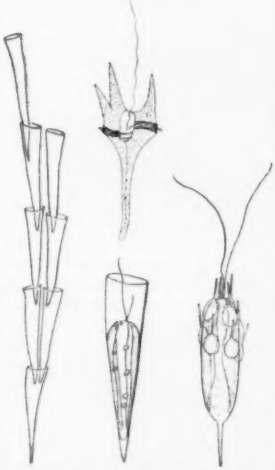


● ***Uroglenopsis* may cause taste and odor.**

● ***Uroglenopsis,* showing individual cells.**



● ***Dinobryon,* yellow brown flagellate.**



● ***Ceratium,* top center; *Dinobryon* at left and center; *Synura,* single cell, at bottom right.**

year, such growths may be controlled by nature. Winter and spring floods carrying silt are destructive to plankton; low temperatures lengthen the time of reproduction; and decreased hours of light have an adverse effect. However, the engineer must recognize that biological growths obey the same laws as the vegetables and weeds in his garden. Peas prefer cool weather. So do most of the diatoms, and the yellow green or yellow brown flagellated algae. Therefore troubles may occur in cool as well as in warm weather.

From a hard water reservoir, diatoms such as *Synedra, Melosira* or *Asterionella;* the yellow brown flagellate *Mallomas;* the green flagellates *Chlamydomonas, Platymonas* and *Euglena;* the olive green flagellate *Cryptomonas;* and occasionally the green non-flagellated algae such as *Dictyosphaerum* may cause trouble. Some of these may occur at any time of the year; they may cause tastes and odors; they clog filters; and they may support an active growth on the filters. Hard water reservoirs, especially if warm shallow lakes, also are subject to nauseous blooms of blue green algae such as *Anabaena, Microcystis, Lyngbya* or *Glestrichia,* and these can be just as objectionable.

Hard water rivers are often literally green, olive green or brown in late summer, with microscopic biologic growths. The writer and a U. S. Public Health Service Sanitary Engineer, the late R. W. Kehr, once computed the Scioto River water at a certain station contained 30,000 ppm of living plankton. The potential BOD of such a water, its possibilities as a bacterial substrate on a filter bed, its reaction to coagulation, its filter clogging potential, and its possible taste and odor causing ability should make an engineer speculate that there surely must be an easier supply somewhere. Nor is this an isolated case—other rivers in Ohio, Indiana, Illinois and Wisconsin have shown equally high counts. In most cases, no single organism is implicated alone, but the aggregate of organisms cause trouble. Once in a while some single organism as *Euglena polymorpha* or *Cryptomonas erosa* is at fault.

Fertilization and topography are primary factors. For example, the East fork of the Kentucky Licking River drains a timbered, sparsely populated area with little arable land, and that not well fertilized. The West fork drains the rich bluegrass country. The plankton content of the West fork is many times that of the other. Because its gradient is steep, a small rain on the East fork sends an abrasive slug of silt down the river, scouring it almost clean of plankton. The small population left must then begin anew to rebuild. A much heavier rain is needed to achieve the same result on the West fork.

The Effect of Sewage

The sewage of man and his domestic animals is a potent fertilizer. The increase of plankton in the Scioto River of Ohio, below the outfall of the Columbus sewage treatment plant, was shown to be very great. Possibly it is not always realized that the richest source of nitrogen in sewage is the urine which passes at once through a treatment plant. The contributions of phosphates by such plants are also large. In worrying about the organic load and BOD contributed by sewage and trade wastes, we would be wise not to forget about the inorganic, soluble fertilizer from the same sources.

Biologic growths in lakes arise from the same general sources. Lake Mendota in Wisconsin, receiving negligible agricultural or human drainage, gave trouble once in two years of study; but neighboring Lakes Monoma, Waubesa, and Kegonsa, more heavily fertilized, especially by the city of Madison and its industries, provide enough

(*Continued on page* 64)

Heating Pavements for

This article was contributed by the Michigan State Highway Department through George E. Marolf.

RADIANT heating of pavement surfaces to remove snow and ice has been successfully used on several installations throughout the country.

Early experiments employed hot water or low pressure steam flowing through 1¼ to 1½-inch wrought iron pipes which had been either embedded in the pavement slab or placed immediately under it, if the slab had a comparatively thin cross section. From these tests came the thought that the heating could be done more efficiently by the use of electrical current, especially in areas where electrical power rates were low. Accordingly, laboratory tests were conducted by the Engineering Experiment Station at Michigan State College in East Lansing and by the Detroit Public Lighting Commission. The results of these tests produced convincing evidence that the heating of pavement surfaces by electricity would remove snow and ice.

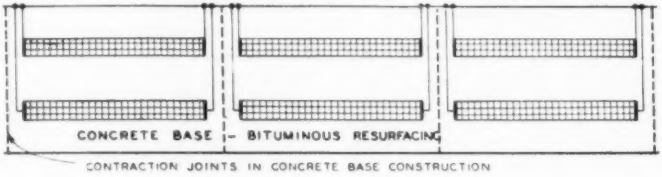
As a result of these experiments, the Michigan State Highway Department realized that this type of snow and ice removal might be ideal for ramps on super-highway intersections. Consequently, in the summer of 1948, the Department authorized the installation of a 1,000-foot trial section on a regular construction project. It was believed that from a practical installation of this type a better knowledge could be acquired relative to cost data and performance of the system under winter conditions.

The site selected for the experiment was Highway M-102 at the west limits of Ferndale, a suburb of Detroit, in Wayne County. At this location, M-102 is a divided highway with the north roadway a concrete surface and the south roadway a bituminous surface. Studies were made of the relative construction and effectiveness of the method for these two types of highway surfaces. The test area for each type of surface was 500 feet in length and located in the inside lane only of the two roadways.

The Heating Elements

Heating elements, consisting of 98-foot lengths of 2 x 2-inch standard concrete sidewalk reinforcing mesh, composed of No. 14 gauge galvanized iron wire, 18 inches wide, were used in each installation. It was necessary to use this length of heating element because the pavement joints were at 99-foot intervals. Two heating elements were put in each pavement lane at 6-foot centers. At the end of each heating element, a ¼ x 2-inch copper bar and terminal wires were brazed to permit connection to the source of power. In the concrete pavement the heating elements were placed two inches below the surface. In the bituminous surface the elements were placed between the base and top course, the top course being approximately 1¼ inches thick. The heating elements were coated with insulating varnish to eliminate any possibility of electric shock to persons or animals.

The system was designed to operate on approximately 50 watts per square foot of heating element. This value was determined from a former experiment to be the most practical for weather and power conditions in Detroit and vicinity. The e.m.f. or electromotive force was kept at 60 volts maximum. Both sides of the roadway were at the same potential and the drop along the roadway was 0.3 volts per foot.



CONTRACTION JOINTS IN CONCRETE BASE CONSTRUCTION

● ***HOW the heating coils are placed and connected in the pavement.***

● ***HEATING elements are being covered with bituminous surfacing.***

Heat Control System

The control system consisted of two recording temperature controllers, one for each roadway, and associated relaying. These controllers were operated by bulbs placed in the pavement half way between the heating element and pavement surface. When the temperature approached freezing, the controller energized the heating elements. After a sufficient rise in temperature, the controller turned off the heating elements. The settings were

Snow and Ice Removal

36 degrees F. "ON" and 38 degrees F. "OFF". These settings allowed for the temperature gradient which existed between the surface of the roadway and the point below the surface at which the temperature detector was embedded.

The master control for this pavement heating installation was turned on by hand about one hour before a snow storm or ice condition as predicted by the local weather bureau, and turned off by hand from observation of all conditions, both weather and pavement.

The electrical work was engineered and installed by the Detroit Public Lighting Commission. Also, through their maintenance and patrol personnel, they have developed an effective procedure for turning the heating system on and off at the beginning and end of snow or ice storms.

● ***CONCRETE section, showing the melted areas in foreground.***

In general, the system performed satisfactorily considering the unusually light snow and ice conditions which were experienced last winter. However, as Michigan did not have a normal winter a year ago, it is not possible to know how satisfactory the method will work under severe ice and snow conditions. Experiments were made this past winter further to test the method. If severe conditions prevail they will provide a more definite check on the system of radiant heating.

Some of the pictures show heated sections, both concrete and bituminous, during a sleet storm. Note how areas over heating elements are free of ice. Other pictures show how the heated pavement appeared during snow storms. In all cases, the melted area did not extend beyond the limits of the heating element. Since the experimental sections were practically flat as to grade, water from the melting snow and ice was displaced by moving traffic, whereas, in a normal installation, drainage would be provided to prevent splashing and carry-over of free water.

In the bituminous section, several spalled areas appeared over the heating elements. These spalled areas are due to displacement of patches placed during construction. The contractor experienced some trouble in installing grids between courses in the bituminous surface. Similar conditions can be overcome on future installations by observing certain precautions while placing and rolling bituminous material over the grids. No difficulty was encountered in placing the heating elements in the concrete section or subsequent to construction.

Some Operational Costs

The heating system was in operation during the 1948-49 season for a total of 505.63 hours at an operation cost of $663.43. On the basis of these figures, the average operating cost per hour would be $1.31.

The power consumption on the bituminous section was approximately nine per cent more than that for the concrete section. The matter of increased power consumption on the bituminous section is being given further consideration because it is not certain whether it might be due to inherent thermal properties of the materials, or installation and operating conditions, or a combination of both factors.

In the event that the method becomes an actuality in ramp construction on the John C. Lodge or Edsel Ford expressways, Detroit's two great super-highways, several factors must be considered relative to estimated operating costs for 1,000-foot heated sections which, it is understood, will be the approximate length of the ramp sections.

In the first place, the normal snow fall for Detroit is 39.7 inches. The snow fall for the 1948-49 winter was 10.3 inches or less than one-third. Therefore, under normal winter conditions, it can be expected that the total cost for electricity for a normal winter season will be slightly higher. The duration of the storm is more important than the depth of snow since cost is dependent on time of operation rather than depth of snow.

Secondly, any possible changes in power rates must be considered. Finally, if it should be desirable to increase the area of heating grids to provide a greater width of bare pavement surface, the heating cost would, of course, increase in proportion to the increased area.

● ***BARE areas shown in this picture taken during icy conditions are the same width as heating elements. Note unmelted joints.***

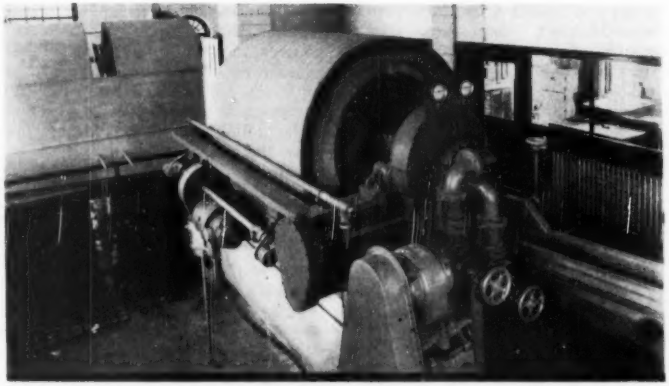
This is the first of a series of articles on the selection and operation of vacuum filters for dewatering sewage and industrial waste sludges. The assurance of sludge disposal throughout the year, irrespective of the weather, and the reduced needs for labor are but two of several advantages of such mechanical dewatering in the municipal field. Many industrial waste sludges yield moisture so grudgingly that open air drying is almost impossible and the use of mechanical methods is highly desirable or necessary. It is believed that many designers and operators of waste treatment plants are not fully familiar with mechanical dewatering and the opportunity it offers for solving many sludge disposal problems and of increasing efficiency and lowering unit costs. It is the purpose of these articles to present usable and reliable data on the subject.

DEWATERING SEWAGE AND INDUSTRIAL WASTE SLUDGES WITH

THE amount of labor normally required for handling and disposing of sludge is greatly reduced by the use of vacuum filters. Since the entire procedure of sludge disposal takes place under cover, weather cannot delay it or affect its efficiency, and the entire operation can be assumed with certainty. In some recent installations, including plants handling as little as 1 mgd, operation is wholly mechanical and automatic, with a bucket elevator or sludge pump handling the liquid sludge to the filter and a belt conveyor loading the dewatered sludge or filter cake into a truck, directly from the filter drum. In one such small plant, the operation is controlled by only three push-buttons. All manual labor in sludge handling is eliminated, and even continuous attention during filtering is not required.

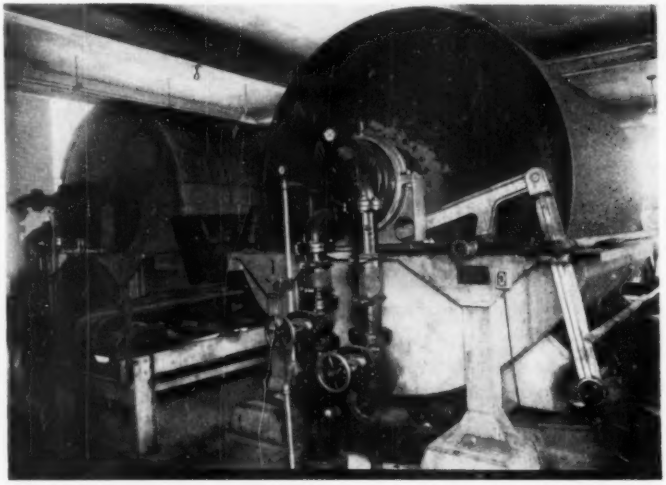
Vacuum filters dewater sludge by employing a small negative pressure or vacuum to aid in removing the moisture from the sludge. Coagulating chemicals are employed to make the sludge filterable and to aid in reducing its water content. Though generally about the same amount of moisture remains in the sludge after filtration as when it is air-dried on beds, the process is generally referred to as dewatering.

A vacuum filter consists essentially of a rotating drum which is submerged about 25% of its circumference in a tank or vat containing the sludge to be filtered. The diameter and length of the drum determine the capacity of the filter. The drum, which is covered with a special cloth or other filter medium, is divided radially into a number of compartments in which negative or positive pressures can be maintained as required to aid in the dewatering process. The portions of the drum which are submerged in the sludge during rotation are kept under a negative pressure or vacuum, so that water is sucked in through the filter agent while the solids are deposited on it in the form of a cake. As this filter cake or sludge blanket on the filter drum rises above the sludge in the vat or sludge tank, it is further dewatered by continuing to draw air through



Courtesy Oliver United Filters

● ***COMPACT installation of vacuum filter unit for sludge dewatering requires small space and permits quick and clean disposal.***



Courtesy General American Transportation

● ***TWIN vacuum filter units installed in a sewage treatment plant discharge the dewatered sludge to a belt conveyor between them.***

it. At about the ¾ point of revolution of the drum, a low air pressure is automatically applied (in most filters) to aid in separating the cake from the drum and to help clear the interstices of the filter medium. The filter cake, loosened by the air pressure, is guided away by a scraper or string discharge and falls onto a belt conveyor for discharge into a truck or into a container or hopper for later removal.

VACUUM FILTERS

Thus, in one revolution of the drum, the solids in the sludge are picked up, dewatered and removed from the filter medium. Depending on the amount of coagulating chemicals used, the type of sludge, and other factors, the dewatered sludge will contain 60% to 80% moisture. This permits handling the sludge by forks (which should not be necessary in a well-designed installation), transportation in an open-body motor truck, and storage in the open without nuisance. A moisture content in this range meets all normal requirements for disposal. To some extent, the moisture content is subject to control through modification of the chemical dosage.

Size of Filter Required

The approximate size of filter required may be computed as follows: Assuming a population of 10,000 to be served, there will be produced daily approximately 2,000 pounds of dry solids. Past experience indicates a production of about 0.18 pound per person per day, but in view of present trends, including the use of home garbage grinders, an increase in this figure may be desirable, producing a larger margin of safety.

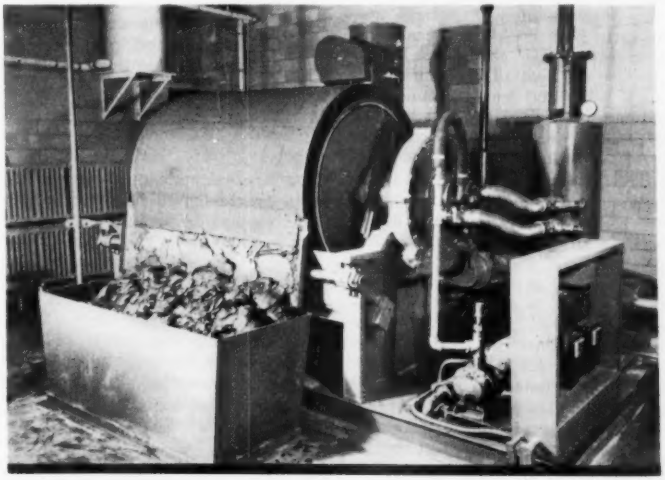
Low rate filters, 2-stage high rate filters and activated sludge plants may remove up to 95% or more of the suspended solids. Single-stage high rate filters may remove up to 85% of the suspended solids. Most of the newer small plants will employ secondary treatment. For the purpose of this article, it will be assumed that 95% removal of suspended solids will be obtained.

Dry solids to be dewatered, therefore, will amount to 95% of 2,000 pounds or 1,900 pounds per day or 13,300 pounds per 7-day week. Assuming a 50% reduction of the volatile content due to digestion, there will remain about 8,800 pounds per 7-day week. With average digested sewage sludge, a filter will handle 4 or 5 pounds of dry solids per square foot of filter surface per hour (with activated sludges, the amount will be less). In small plants, it is rarely desirable to plan to operate the filter more than 30 hours a week; and it is better, in view of the small extra cost of additional filter capacity, to consider a 12 to 16-hour operating week, especially where there is but one operator. Unit operating costs will be no higher with the larger filter; and experience has repeatedly shown that surplus sludge handling capacity is desirable, since the solids-disposal units in most sewage treatment plants are the ones which first show signs of overloading. The shorter week gives time for other duties, servicing, washing, holidays and lost time. It also gives overload capacity for the future or for peak load conditions which occur in so many plants for so many and various reasons.

Where operation is fully automatic, as previously mentioned, the added capacity gives the operator more freedom in planning his other work and in correlating efficiently the operation of the entire plant. Operation of an automatically controlled unit for 30 hours per week may require the actual attention of the operator for no more than a third of this time.

Assuming 5 pounds of dry solids per square foot of filter surface per hour, and a 16-hour operating week for design, each square foot of filter surface will handle 80 pounds of dry solids per week and the total filter surface required for a population of 10,000 people will be 8,800 ÷ 80 or about 110 sq. ft. This size or the next larger standard size of available unit should be used.

On the smaller jobs, either one or two filters may be used. However, there is little advantage in small plants, with present-day filters which are well made and mechanically rugged, in having two filters. More space is required; and, in some respects, operation of a single drum filter is simpler than the operation of a twin unit of two smaller drums. This statement does not apply in large plants, where several units may be desirable.



Courtesy Eimco Corp.

● ***VACUUM filter of the package unit type, with a 4-ft. diameter by 6-ft. drum, dewaters the sludge produced in a small plant.***

A 6-ft. diameter drum has about 19 sq. ft. of filter surface per foot length of drum face. Therefore, a 6 x 6 filter, that is, a filter with a drum 6 ft. in diameter and 6 ft. long, would have an area of 114 sq. ft. and would be amply large for the installation considered above. An 8 x 8 filter would have an area of 3.14 x 8 x 8, or about 200 square feet of surface.

Most of the filters now made are available in such ranges of size as to fit the needs of any plant. Drums are available from 3 ft. in diameter to 14 ft. and in lengths up to 16 ft. In the smaller sizes, entire package or assembled units can be furnished, complete with piping and all accessories, ready-mounted on a base. Pilot test units are also available so that a plant may have a preview of the results it may expect to attain in sludge dewatering. Such pilot operation often develops information that is later of great value in quickly obtaining satisfactory operation of the full-size installation.

Since an 8 x 8 filter will handle about 1,000 pounds of dry solids per hour, it will dewater the sludge from a population of more than 22,000 people. Under proposed regulations of the Health Departments in the Ohio and Upper Mississippi River Basins, for drying sludge on beds 1.5 sq. ft. per capita of uncovered beds must be provided. For 22,000 population, 33,000 sq. ft. of sludge bed area would be required. In many places it is difficult to find an area of that size readily available at treatment plant sites; also the presence of such a large area of open beds could be a source of nuisance. Local conditions largely control the cost of construction of such beds, and weather conditions largely influence their operation. Both of these factors may be weighed against the initial and operating costs of vacuum filters.

Weight should also be given to the possible improvements in digester operation resulting from ability to draw and dispose of sludge at any time. Experience has shown that freedom to draw sludge whenever the need is indicated is an important factor in good digester control. If sludge is not drawn promptly, digester supernatant may carry so much suspended organic matter as to upset the operation of portions of the treatment plant. Elutriation may be considered as giving a more filterable sludge at a lower conditioning cost, but it requires a more costly initial installation.

LEADERS IN THE PUBLIC WORKS FIELD

A. P. BLACK

Congratulations to A. P. Black for a remarkable job in guiding the destinies of the American Water Works Association during the past year. As its president, he has visited many of its sections. His leadership and personality have been essential factors in his many contributions to the membership of the Association. Head of the Chemistry Department and Professor of Chemistry at the University of Florida, he has long been a leading figure in the chemical and water works field.

A building about 30 ft. square will provide space requirements for a filter having a drum size up to 8 x 8. This space will be sufficient for the filter; the sludge sump and sludge elevator; the ferric chloride feeder; lime solution tank and lime storage; lime feeder; sludge conveyor; filtrate sump; and controls. Power requirements vary, but power consumption is a negligible factor in comparison with the all-year operability of a filter.

In succeeding articles recent installations, with design data and cost, where available, will be described; also operating data and instructions for operation; information on chemicals and the chemistry of sludge conditioning; operating cost data; typical specifications under which competition for any installation can be assured; information on installations serving raw sludges, digested sludges and industrial waste sludges; and a discussion of the sanitary aspects of sludge filtration and disposal.

Water Borne Disease Incidence in 1948

The U. S. Public Health Service has issued a report covering the incidence of water borne disease during the year 1948, as reported by State and Territorial health authorities. In all, 20 separate outbreaks were reported, with 519 cases of disease and 4 deaths. Only four of the outbreaks occurred as a result of polluted public water supplies, the remaining supplies being school, private or industrial.

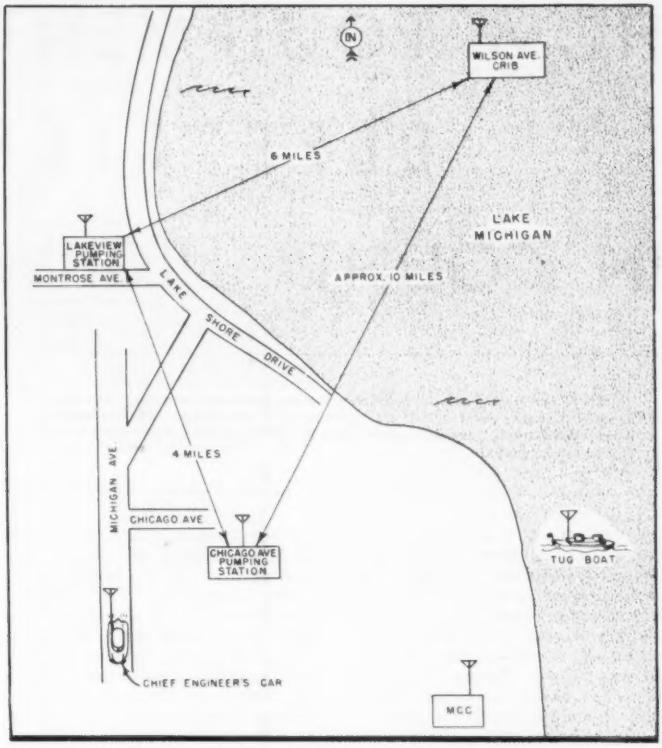
Of the four outbreaks occurring where public water supplies were used, one, in San Francisco, was due to back siphonage from an improperly installed kitchen sink. Another, at Phillipstown, N. Y., was thought to be due to water from an incompleted water supply system for a housing development. The mains had not yet been sterilized and signs had been placed warning against use of water. A third, at Comerio, P. R., resulted in 81 cases and 4 deaths. This was a surface supply and the chlorinator was out of order for two months. The fourth outbreak, at Bishop, Virginia, could not be definitely traced to the water supply, though evidence pointed to this as the source.

The other outbreaks included one industrial, one school and 18 private supplies. Drainage to wells and springs, and use of temporary or emergency supplies accounted for most of these.

Nine Engines for Sewage Treatment Plant

The Hyperion sewage treatment plant, Los Angeles, Calif., will handle 245 mgd of sewage and is expected to produce about 4,000,000 cu. ft. of sludge gas. About 60% of this will be used to drive engines and generators to produce the electricity needed to operate the plant, and to run the centrifugal blowers. Nine Worthington dual fuel engines are being installed; five will drive Allis-Chalmers generators for power production and four will operate the blowers. These engines are 8-cylinder, 16-inch bore and 20-inch stroke.

● ***HOW the pumping stations on the shore, the tug boat and the chief engineer, from field or office, maintain radio contact at all times.***



CHICAGO WATER DEPARTMENT INSTALLS RADIOTELEPHONE

THE Water Department of Chicago, Ill., has installed a city-wide radiotelephone system, integrating its pumping stations, department vehicles, tugboat and water supply cribs in Lake Michigan into a compact radio network. Formerly, Chicago depended on telephone communication. A submarine cable was used from the cribs in the lake to land points in the system. This cable occasionally was broken or out of service, preventing communication; also the tugboat, which is a part of the city's water patrol operation, could not be contacted when it was away from its pier. To overcome these difficulties, and to increase the operating efficiency of the system, the radiotelephone system was installed.

Chicago's radio system is of a standard type, but incorporates a selective calling system which permits standby personnel to be reduced to a minimum and enables the operator to call only one station or group of stations, as required, even though all receivers in the system are tuned to the same frequency.

The locations that are equipped with radio include two pumping stations (Chicago Avenue and Lakeview Avenue), and the Wilson Ave. crib. These have Federal desk type consoles. The cabinet houses a transmitter, receiver, speech amplifier, selecto-call decoder, and associated equipment. On the front of the console are mounted a speaker, indicator lights, bell and microphone connectors.

The tugboat is equipped with an upright transmitter-receiver cabinet which is installed in the forward hold of the boat. In the pilot house are mounted a tone selector, speaker housing, bell and call light. The two pumping stations, the crib and the tugboat can communicate directly, as all four stations operate on the same RF frequency. Each of the four locations is equipped to send or transmit tone calls to either of the other three stations and receive on one particular tone frequency.

Further to integrate the overall communication network, the city engineer, W. W. Deberard, has installed in his car a mobile set tuned to the local MCC frequency. This enables him to receive or send messages to his office at City Hall, or to pumping stations and tugboat via interconnecting land lines in the MCC office. Ties with the MCC radio station and the land lines make it possible for the engineer to be reached directly at all times, whether he is in office or field.

HOW EQUIPMENT IS USED EFFECTIVELY IN COUNTY HIGHWAY WORK

This is the second article describing the use by county engineers of various kinds of highway construction and maintenance equipment. The first article, in our April issue, covered reports from the Northeastern, Southeastern and Southwestern States.

In Iowa, L. W. Croft, Engineer of Dallas County, finds tractors and scoops or an elevating grading best on secondary roads; he also uses a mechanical loader for reclaiming gravel on reconstruction—at a substantial saving. Howard C. Porter, Acting County Engineer, Jones Co., Iowa, used four motor graders and two small scoops for getting a permanent grade on 19.5 miles of road, the graders doing most of the work. Audubon Co., W. C. Stone, County Engineer, used four tractors equipped with bulldozers and 8-yard scrapers on local road construction. He says he finds tractors with both bulldozers and scrapers are very effective on such work. He uses the dozers to push down the back slopes, making a flat slope with a minimum of work. The scrapers are then used for hauling to fills. Used in this way the tractors give double duty.

Theodore Robinson, County Engineer, Wayne Co., Iowa, says: "The bulldozer is one of our most valuable machines for taking out brush and building grades." L. L. Lowry, County Engineer of Howard Co., and Hugo Benefiel, County Engineer of Union Co., are strong for tractors and scoops, the former using 8-yd. capacity units. R. T. Johnson, Engineer of Hardin Co., reports good work with four tractor scoops, a sheepsfoot roller, a motor grader, a bulldozer and an elevating grader. G. N. McQuorn, County Engineer, Warren, Co., moved 40,000 yards of dirt in 10 days on a 2-mile stretch of road, using an elevating grader, three motor graders and a tractor scoop.

Other Iowans who have found tractors and scoops effective on grading are County Engineers C. Arthur Elliot, Greene; C. A. Spaethe, Van Buren; W. K. Chantry, Iowa; and T. E. Riley. Henry F. W. Akers, County Engineer, Calhoun, used a tamping roller for the first time in this county and found it effective. Bulldozers and scoops did a fine job for Fremont County, R. H. Greenwood, County Engineer, on highway construction. M. Y. Kinne, County Engineer of Hamilton Co., got excellent results from a pulverizing mixer in mixing clay and gravel.

A front-end loader has been used effectively for culvert and bridge excavation and ditch cleaning by Dickinson Co., Kans., G. W. Houser, Engineer. A heavy crawler tractor and bulldozer was the only equipment that could handle the snow in Thomas Co., Kans., Emmon Robbins, County Engineer. A dragline was used by Morris County, Kans., D. F. Meath, Engineer, for getting gravel out from under water; in a dry creek bed, gravel was taken out with a crawler tractor-mounted ¾-yd. front-end hydraulic loader. Roads were re-elevated in Sherman Co., Kans., by using an elevating grader pulled by a crawler tractor. George M. McKee, Jr., is County Engineer. In elevating roads with an elevating grader, Stevens Co., Kans., R. E. Campbell, Co. Engineer, follows with two motor graders right behind the elevator. This keeps the road passable and also improves compaction.

In Montgomery Co., Kans., Rex Lucas, County Engineer, reports that a high lift loader was especially valuable on quarry and crushing work. A. W. Young, County Engineer, Allen Co., Kans., says "We used motor maintainers, draglines, power shovels and trucks for hauling and spreading gravel and crushed stone; and three spray outfits for applying 2,4D. During 1949, we sprayed most of our 900 miles of roads. We had two tractor sprays and we mounted one on either side so that we could spray both sides of the road at one trip. A third spray outfit was truck-mounted, with a long hose to reach fence corners at intersections, so as to provide better sight distance at such intersections. We believe we did a pretty good job of killing brush at the corners, but we cannot tell for sure until next growing season."

An elevating grader 13 years old was used to elevate 30 miles of road and build up low places on 22 miles, in addition, for Rush County, Kans., Clarence Cunninham, County Engineer. Marshall Co., Kans., C. T. Morbacher, County Engineer, got gravel for road surfacing from under water with a 6-inch suction pump, a diesel power unit, a chain cutter and a dredging ladder.

New Distributor Speeds Surfacing

"We used a new 1,000-gal. asphalt distributor, purchased in May, 1949, and treated over 50 miles of bituminous surfaced roads with our own crew at 40% savings in cost. During the coming year we plan to resurface 20 miles with drag treatment, 20 miles with doublt seal, and 70 miles with crushed rock." M. M. Steele, County Engineer, Johnson Co., Kans., Labette Co., Kans., Charles Smay, Engineer, reports "excavating, loading and hauling shale for road surfacing, using a bulldozer for excavating the shale and a front-end loader to handle it into the trucks."

Edwin P. Knapp, Smith County Engineer, Kansas, writes: "It is impossible to state definitely which

Courtesy Frank G. Hough Co.

● ***FRONT-END loader, owned by a Georgia County, loads crushed stone from a stock pile—but one of many jobs it can do.***

type of equipment is most effective, due to the fact that we are faced with both construction and maintenance. The general public would no doubt elect, as our most interesting job a 10-mile grading and drainage project which was constructed to high standards of modern design. We have operated on this project two crawler tractors with bulldozers and scrapers and two large motor graders. The project included heavy cut and fill sections and some 10,000 cu. yds. of rock excavation. Shoulder and bank slopes are three to one except in deep cut or high fill sections, where they are two to one. The travel surface will be 26-ft. wide, except for a few existing bridges which will be replaced as soon as funds permit. Minimum clear structure clearances are now 20-ft."

"The machine of most diversified usefulness on roads and bridges is our ½-yd. dragline, but we could not get along without our motor patrols."—E. L. Walker, County Engineer, Pottawatomie Co., Kans. In Sedgwick Co., Kans., Rufus Kirk, County Engineer, finds the most useful equipment to be "bulldozers on stream channel changing behind draglines, and also for widening pilot channels; also rubber tired scrapers pulled by rubber tired tractors on grading jobs; and 12-yd. trucks on sanding." This county has 148 self-propelled machines and 98 others.

"We began using a crawler tractor with 1-yd. front-end loader about May 10th, and used it practically every day until freeze-up. We employed four 1½-yd. trucks, and some of the time a 40-ft. conveyor, with the loader. We loaded about 25,000 cu. yds. of material. We have nearly 500 miles of road, and with this equipment we did 75% of our gravel resurfacing, all our new surfacing, provided aggregate for 5.5 miles of bituminous surface, sloped banks, raised embankments, excavated and backfilled frost boils, buried rocks, installed culverts and filled many washouts. This is a very economical unit to operate and is the most effective equipment we own. We formerly employed 7 truck crews of 3 or 4 men each for the work described above, and contracted our surfacing besides"—E. G. Chilton, County Highway Engineer, Becker Co., Minn.

"We used one pulverizer, two motor graders with scarifiers and one sheepsfoot roller, which were owned by the county, and one pneumatic roller, which we rented. With this equipment, we reconditioned 2 miles of black top. About one mile was through two small villages that had the old type of high curb and gutter, with the center of the street very high. We scarified the entire width of 44 ft. to 60 ft. and after breaking up the old material with the blades, pulverizer and sheepsfoot roller, placed it back, filling the gutters to a depth of about 5 ins. and leaving a 6-inch gutter; then we added water and compacted with the two rollers. We then added a 1½-inch bituminous mat. The total cost of reshaping, compacting and placing the mat amounted to 24.8 cents per sq. yd. We had previously corrected several weak spots in the subgrade by excavating to a depth of 42 ins. and backfilling with compacted granular material. The cost of subgrade correction was not included in the cost stated above" A. B. Klessing, County Highway Engineer, Martin Co., Minn.

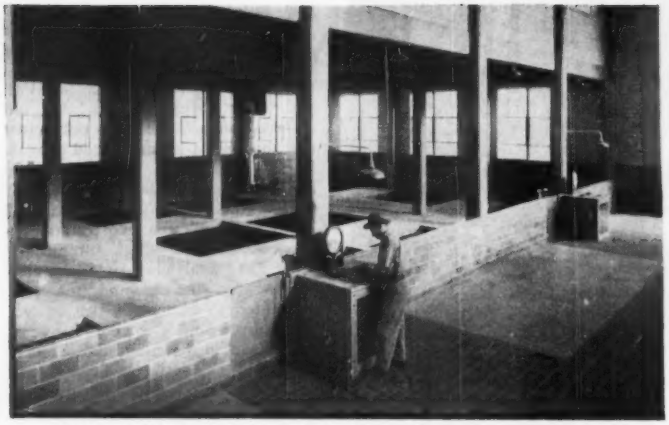
In constructing a road-mixed bituminous surface, Dakota Co., Minn., H. E. Palmer, County Highway Engineer, used a bituminous distributor, a power broom, a soil mixer, a pneumatic roller, a flat wheel roller and motor graders. Ramsey County, Minn., Harry S. Bronson, County Engineer, used a bituminous paver in laying 15 miles of new bituminous pavement.

Equipment was used most effectively by McLean Co., N. D., L. J. Johnson, County Engineer, on a FAS road contruction project. There were employed seven heavy crawler tractors, three power scrapers, a motor grader, bulldozers on two tractors, and a stone crusher.

Another installment of this article, covering western and east north central states will appear in an early issue.

Courtesy Huber Mfg. Co.

● ***MOTOR maintainer, owned by the West Virginia State Road Commission is shown working on shoulder maintenance.***



● *SOME of the filters at the Oklahoma City plant. Infilco operating table shown in foreground. Pumping units are underneath.*

● *WASH water agitates angular particles more effectively.*

How ANTHRAFILT is used

J. A. OLDENBURG

Secretary, Palmer Filter Equipment Corp.

PROBABLY no other change in filtration technique since the advent of the rapid sand filter, has aroused the same amount of interest, as has the development and use of Anthrafilt, the hard coal filter medium.

Since Anthrafilt is now widely used in municipal, industrial and swimming pool filters, both in the United States and abroad, many people who read this article will have had actual experience with this material and will of course know exactly what it is, and what it will do for their filters. However, for those readers who have not as yet used Anthrafilt, or had the opportunity to become conversant with it, a brief description will be necessary.

What is Anthrafilt?

Anthrafilt is a filter medium made from selected Pennsylvania anthracite which has been cleaned so as to have a minimum ash content. This cleaned anthracite is screened and classified hydraulically to yield sizes suitable for filter purposes.

The word selected is not merely another adjective, for all Pennsylvania anthracites are not well adapted to filter use. The best Anthrafilt is made from anthracite that is low in ash and high in anthraxylon; and has a low friability or fracture incidence. The shape of the particle is highly important, as is its degree of hardness.

Anthrafilt, as now prepared for filter use, weighs about 53 pounds per cubic foot, as compared to 100 pounds for sand. The specific gravity of Anthrafilt is approximately 1.60, against 2.65 for sand. Anthrafilt is half as hard as sand but just as tough. Losses due to attrition amount to 0.2% per year, which is no greater than that of sand. Data on ten years operation in one large filtration plant show very little change in particle size.

Not Affected by Alkalies

Since Anthrafilt is essentially a pure carbon there is no chemical reaction with either acid or alkaline waters or chemical solution. Such an inert material makes an ideal filter medium, not only for the filtration of all types of water for sanitary purposes, but also for boiler feed water, boiler condensate, process water, and many types of chemical solutions encountered throughout industry.

Coatings of all types with the exception of uncoagulated oils and greases do not build up as fast on Anthrafilt as they do on sand; nor do they adhere as tenaciously to the carbon surface. This is especially true of lime. Laboratory experiments show that lime does coat Anthrafilt, but very slowly. The resulting coating, however, flakes off easily and does not cement grain to grain as it does in the case of sand. There is apparently a chemical reaction between the alkaline lime and the acidic sand which tends toward a tight bond. There is no such reaction between Anthrafilt and alkalies.

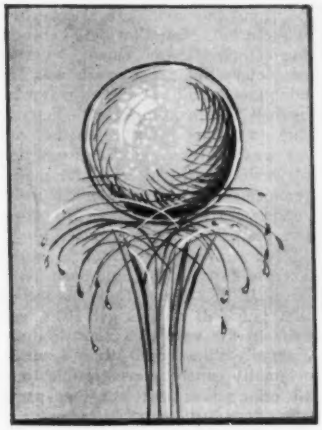
Iron and manganese salts are precipitated on Anthrafilt in the form of a dark brown slime when the applied water is treated with lime and coagulated in the normal manner. This coating is almost entirely removed during backwashing and does not accumulate as a permanent coating.

It is commonly thought that sand, after it has become coated with iron and manganese salts, is effective in the removal of these salts from solution; but in actual practice Anthrafilt, with no pronounced coating, will remove about twice as much iron and manganese as will coated sand.

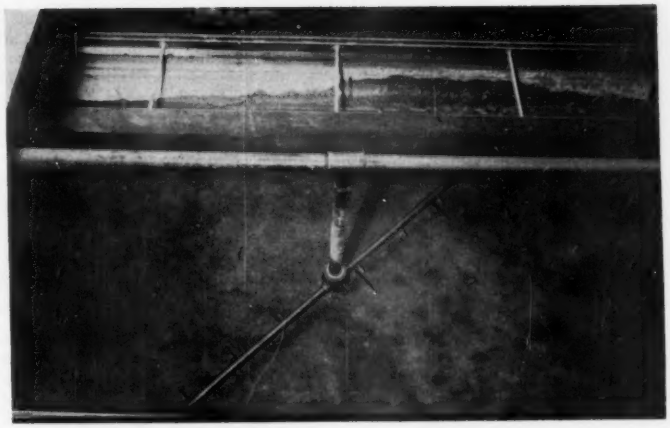
Why Long Filter Runs

Anthrafilt is a low head-loss filter media. The initial loss of head is lower than that for sand and the final loss of head is rarely greater than 4 to 6 feet in spite of very long filter runs.

Mention of long filter runs will



● ***SMOOTH** sand grains require higher wash water velocity.*



● ***CLOSE-UP** view of the Palmer filter bed agitator and surface washer installed at the Oklahoma City filtration plant.*

in WATER FILTRATION

naturally bring up the question as to why longer runs are possible with Anthrafilt. First, let us consider the general trend of the filter field in regard to the so-called proper size of a filter medium. There are several methods of determining and expressing the size of filter media based on Allen Hazen's work on effective size and uniformity coefficient. Baylis' improved method uses an average of a combination of sizes; while Riddick prefers a percentage retained on screens rather than effective size and uniformity coefficient. Actually it makes little difference which method is used as long as the method chosen can be intelligently adapted to operating conditions.

During the early development of the rapid sand filter it was thought that small effective sizes were necessary to produce good quality filter effluent. At this stage of filtration this was a very practical line of reasoning because pretreatment as we know it today was non-existent. A filter bed of fine medium (at least the top layer had to be fine), was necessary to strain out the collodial and uncoagulated matter. Even then rates had to be held very low in order to produce a fair quality of effluent.

In the slow sand filters previously used low rates had been a necessity, so any increase in rates resulting from the use of rapid sand filters was a decided improvement. Because higher rates could be obtained in the rapid sand type, filter area could be greatly reduced. Reduction in filter area made it possible to design more compact plants. The net result was that rapid sand filters definitely took over the field.

Developments in Filtration

Many waterworks men, however, realized that they were not getting complete efficiency from these filters because at certain periods, either seasonally or otherwise, it was difficult to obtain good quality floc. As a result better designs of sedimentation or retention basins were developed and experimentation was begun with various coagulants. Subsequently methods of applying coagulants were developed, which further increased their effectiveness.

Development of these factors led to quality control of effluent regardless of the condition of the raw water. It was possible to operate rapid sand filters continuously at the highest allowable rates. These rates, however, had been conservatively set at about two gallons per minute per square foot due to past experience in slow sand filters and early results obtained with rapid sand filters. From the standpoint of public safety, and as a limiting factor to curtail excessive use of high rates at the sacrifice of effluent quality, such a limiting rate was definitely needed. However, as better pretreatment came into general use, and as the concentration of population created greater demands upon filter plants, the need of increased capacity caused filter operators to search for methods of safely increasing rates.

Getting Higher Filter Rates

Such increased capacity could of course be attained by simply increasing rates providing pretreatment facilities were adequate. The only restraining factor was the fact that the small grain filter medium then in use had such a high loss of head and loaded up so quickly at the higher rates, that excessive washing was required. This in turn became a limiting factor, negating the advantage gained from higher rates. Increased consumption of wash water and time out for filter washing tended to offset gains obtained by the higher initial operating rates.

The only way to overcome this condition was to increase the effective size of the filter medium. Repeated tests by eminent men in the filter field had proven that a coarser medium would produce higher rates for longer periods of time, and that the quality of effluent would be very good providing the

applied water was well flocculated. The only deterrent to the use of coarser medium was the ability to supply sufficient wash water for proper expansion during the backwash cycle.

Some plants had excess backwash water capacity and could therefore increase the size of their medium almost as desired. The only limiting factor was the proportion of wash water required in relation to the amount of filtered water, since the coarser medium necessarily took much more water to cause proper expansion of the bed during the backwash. Many plants however were definitely limited in the amount of wash water which they could apply, so they could not increase media size without recourse to some supplementary type of wash.

The supplementary wash developments were as varied as original filter designs. Out of the numerous types and variations, mechanical rakes, the stationary grid system, and air wash were predominant. Even with these aids the upper limit of effective size was about 0.60 mm. For a considerable period of time it looked as if nothing further could be done to increase safely and economically rates or the length of filter runs.

Water works engineers began to look for an entirely different type of filter medium as a solution. J. H. Fuertes decided to try anthracite coal and finally specified it for filters at Steelton, Pa.; Dallas, Texas; Cumberland, Md.; and Denver, Colorado. The first installation was made about 40 years ago.

These plants are still using anthracite and are well pleased with results. With the exception of Dallas, the filters were not conventional in design and did not use a high grade prepared Anthrafilt. The nearest approach to a graded conventional medium was that used at Denver, where the original anthracite was crushed and screened at Denver after being shipped from Pennsylvania as river coal.

Very little was done to develop further the use of anthracite as a filter medium until about 18 years ago when the Anthracite Institute retained H. G. Turner to investigate the possibilities of securing and producing proper sizes of material for use as a filter medium. Exhaustive laboratory tests were made of various grades of Pennsylvania anthracite to determine the best grade of raw material. Subsequently tests were then made to ascertain the correct sizes required to replace sand so as to give maximum efficiency under all normal conditions. These tests definitely proved that a .60-.80 mm. anthracite medium could produce good quality effluent at considerably higher rates, with longer runs and less wash water requirements, than was possible with comparable sizes of sand.

Continued tests proved that the larger angular shaped particles presented more area for entrapment of floc; and since these stratified less than sand when backwashed, the entire bed depth, and not merely the top few inches, took part in filtering.

Checks made with the plants which had been using anthracite verified the results obtained in laboratory tests. It was apparent that this material was an answer to the need for a coarser medium with low head loss, capable of removing floc, but light enough so as to expand properly with a minimum amount of wash water.

Suitable equipment for the preparation of the proper sizes was secured and production of an anthracite filter medium was begun under the registered trade name of Anthrafilt. Both the fine filtering sizes equivalent to sand, and the larger sizes corresponding to the supporting gravel are now produced. There are now Anthrafilt filters in use throughout the United States, Canada, Central and South America and abroad.

Anthrafilt Advantages

Reports of successful operation vary in degree according to the particular condition at the plant in which it is used. Some reports stress increased rates and capacities up to double their previous records. Some point out the savings in wash water, while others state that they can now keep their filters clean, whereas previously their backwash was inadequate. Still others stress the overall increase in plant efficiency due to longer runs, less time out for washing, decreased consumption of wash water, and less filter maintenance due to clean filters. No two reports are exactly alike, just as no two plants are identically alike.

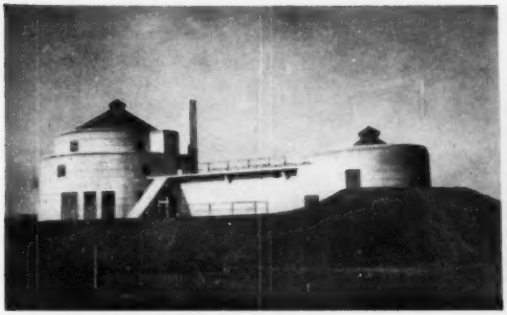
There have, of course, been some adverse reports. No item can be a cure-all, nor can it be expected that you will always get 100% results in the trial of a new product. Probably the one thing which originally caused more trouble than all others was the fact that some users reported loss of filter material during backwash.

Investigation almost always proved that either there was poor control of backwashing resulting in bumping of the filter bed, or that the operators were still using the same rate of rise for Anthrafilt as they had previously used for the proper expansion of sand.

Since a particle of Anthrafilt weighs only about one-half as much as an equal sized grain of sand, it can be seen that a lower rate of rise should be required for expansion of an Anthrafilt bed. Another reason for lower rates of rise is the fact that the angular particle of Anthrafilt presents more surface to be acted upon by the upward thrust of the water. Still another is the lower specific gravity of the Anthrafilt. Corrections in operating procedures have generally solved such complaints to the entire satisfaction of the operators involved.

(*Continued on page 76*)

● ***FILTER plant of the Passaic Valley Water Commission at Paterson, N. J., one of the many large plants using Anthrafilt.***



● ***PLANT at Foley, Minn., has two covered filters, 35 and 25 feet in diameter.***

● ***LADYSMITH, Wisc., plant has 81-ft. high rate filter covered with Hewett dome.***

THE CASE FOR HOUSING TRICKLING FILTERS

HUGH C. LEIBEE
and ROBERT J. ELLISON

Mr. Leibee is a consulting sanitary engineer and Mr. Ellison is with the Banister Engrg. Co. Both are in St. Paul, Minn., which is an area of much cold weather.

WHEN viewed from the position of other states, Minnesota might appear to be out of step in having a state requirement, in effect for many years, that biological filters must be housed.

We, as practicing engineers, believe that this is entirely justified as a sound and reasonable requirement in obtaining better treatment. Our contacts with other engineers, practicing in an area where housing of filters is not customary, indicate a skeptical attitude towards such protection.

The arguments usually presented against housing of filters are three: 1) that the cost is excessive; 2) that biological action is less efficient in covered filters; and 3) that air movement and ventilation are better without housing.

It would appear that much of the objection to housing filters because of cost is based on the high cost of housing the old low capacity filters with their enormous areas. Today the large majority of filter plants are of the high rate or high capacity types. These filter types have a relatively small surface area and the cost of housing should amount to not less than 1% nor more than 8% of the gross cost of the treatment plant. This is not an unreasonable amount and can be justified on the basis of other benefits. It is customary to use wood roofs on filters up to forty feet in diameter and prestressed concrete domes for larger sizes.

Illustrations of Covered Filters

The illustrations show examples of each of these cases. The plant at Foley, Minnesota, has a 35-foot diameter first stage and a 25-foot second stage high capacity filter, both covered by wood framed roofs. The Ladysmith plant has an 81-foot diameter high capacity filter covered by a Hewett Dome.

The argument that biological action is impaired by the absence of sunlight is generally advanced as the principal argument. It is obvious that this argument applies only to the upper few inches of the filter and has no basis on fact of which the writers are cognizant. The fact that biological life increases in activity as temperatures rise above the freezing point, within reasonable limits, is a sound argument that housed filters will function more efficiently during cold weather than unhoused filters. This rule of biological activity decreasing as temperatures, over the range of sewage temperatures, drop, is fundamental biology that cannot be disputed. In northern climates, temperatures drop to the point of freezing and the lessening of biological activity is quite marked. The same general effect must occur in the south, but to a lesser degree, of course.

The micro-organic life in a filter is basically aerobic. The need of air is as intense as the need of food. An article published in Industrial & Engineering Chemistry of June, 1939, "Aerodynamics of Trickling Filters" by Edgar L. Piret and others, appears to be the only reasonably complete study of filter air movements. The conclusion of this article is that a differential of more than seven degrees between the air and sewage is required to produce either cooling or heating of the air sufficient for stack movement of the air. In the case of the open type filters, the stack height of the filter is limited to the depth of the media; when housed, the stack height is measured from the bottom of the filter to the roof vent. The greater the vertical stack distance and air temperature change the more positive the air movement will be.

In addition to the three conditions discussed above, a housed filter will, in removing an objectionable feature, help to create an attractive public utility. Housing will produce excellent odor control; will lessen the spread of filter flies; and will prevent unnecessary insect contact with the filter flora.

● *ATTRACTIVE grounds of the sewage treatment plant which was built about ten years ago.*

Planned Public Works

ROBERT R. McINTOSH

Director of Public Works, Battle Creek, Mich.

AS stated in a previous article, a survey of the sanitary sewer situation indicated that there were forty-five miles of streets serving 12,500 people which were not equipped with sanitary sewers. Many petitions from the citizens dating back to 1938 were on file but these sewers could not be constructed due to the lack of funds and trunk line connections.

The Engineering Division of the Department of Public Works made estimates covering the cost of the entire program for the installation of additional sewer facilities. This estimate developed the fact that it would require approximately $1,250,000 to bring the sewer construction of the City up to date so that upon the completion of the program, the city would be faced only by extensions from time to time in accordance with population growth. Of this amount it was estimated that between four and five hundred thousand dollars would be required for the City's share of cost of trunk line sewers, since the policy of the Department of Public Works has been to assess only the cost of sewers not exceeding 8" in diameter.

Accordingly the City Commission passed an ordinance combining sewer and water revenues and marketed bonds in two issues totaling $490,000 to act as a revolving fund for the construction of trunk line sewers and laterals over a ten-year period. At the end of this time it was estimated that the forty-five miles of sewers would have been constructed and the assessments made in addition to the funds from the bond issue would cover all the costs of sewer construction.

● *NIGHT lighted baseball field; other fields are shown in rear.*

Progress in Sewer Construction

In 1948, 38,105 lineal feet of sanitary sewers were laid benefiting approximately 2,000 people, living in five hundred dwellings in three long-neglected areas; and in 1949, 18,140 lineal feet of sanitary sewer were laid benefiting approximately 1,164 people living in 291 dwellings. About one-half of the sewer construction in 1948 was let by contract. The balance was constructed by city crews on force account, sufficient equipment having been purchased to equip completely two sewer construction crews. In 1949, all of the sewers were laid by city crews on force account and it is anticipated that the program can be completed by the City forces.

During the past two years of construction the Sewer Division has completed 56,245 lineal feet, or 10.65 miles, of the forty-five miles originally programmed and it is apparent that the work is progressing at such a pace that the program will be completed as scheduled.

In addition to the sanitary sewer construction the city completed construction of 1,844 lineal feet of storm sewers during 1948, and 4,140 lineal feet during 1949, for a total of 5,984 lineal feet.

All these sanitary sewers were financed, as previously mentioned,

● ***WILLARD Beach bathhouse as it appeared after completion in the summer of 1949.***

Sewerage and Recreation

by the issuance of revenue bonds against combined water and sewer revenues. At the same time, the city sought the advice of a firm of consulting engineers, Jones, Henry and Schoonmaker of Toledo, Ohio, and this firm made exhaustive studies of the water and sewer rates. The intention was to produce sufficient revenues to make the sewer maintenance and construction divisions and the City's sewage treatment plant self supporting; also, at the same time to provide revenue to support the sewer bond issues while retaining freedom for a future issuance of $1,150,000 for long-range improvements to the water distribution system and for the erection of 4,000,000 gallons of above-ground water storage and expansion of the pumping station facilities. The matter of long-range water improvements will be discussed later and this program is to be completed in 1950.

The City in 1935 and 1936 constructed a primary sedimentation sewage disposal plant which was increased in 1943, with the assistance of Federal funds, to accommodate the thirty-five thousand soldiers located at Fort Custer in addition to the City's requirements. This made it unnecessary for the military authorities to construct an additional plant to take care of the Fort Custer sewage.

Recreation Program

The recreation program of the City of Battle Creek is administrated by a Director of Buildings, Grounds and Recreation. This takes in all the parks; the recreational building, known as the Youth Building, which was donated to the City by the W. K. Kellogg Foundation and is located in one of the principal parks; and Bailey Park, in which the City has been fortunate to have incorporated six hard ball baseball diamonds and two soft ball diamonds. One of these diamonds was equipped with a small brick and concrete stand capable of seating about three hundred people. The Recreational program for the use of these diamonds is administrated by a local organization called the Health and Recreational Association which is composed of prominent citizens of the City of Battle Creek interested in educational and youth activities.

Under the auspices of the Health and Recreational Association the Michigan Amateur Baseball Congress is held in Battle Creek each year bringing teams from all over the United States. The Association in 1948 negotiated a contract with the officials of the American Baseball Congress to hold their competition in Battle Creek for an additional five years providing that the Association arranged for a night-lighted ball park of sufficient seating capacity and of the dimensions required by the American Baseball Congress. The Association shortly prior to this suggestion had been fortunate enough to have an enclosed ball park suitable for daylight games turned over to them for operation by the Post Cereals Division of the General Foods Corpora-

● ***SANITARY sewer construction, showing work on So. Washington Ave.***

FREE

to WATER WORKS and SEWAGE MEN

HOW TO CONTROL ALGAE

"The Use of Copper Sulphate in Control of Microscopic Organisms" by Dr. Frank E. Hale (former Director of Laboratories, Dept. of Water Supply, City of New York) is an authoritative work concerning the control of micro-organisms and elimination of tastes and odors. Describes in detail methods of controlling various forms of microscopic life commonly encountered in water supply systems. Contains descriptive material, plus 48 photo-micrograph studies of organisms discussed.

ROOT AND FUNGUS CONTROL

"Copper Sulphate for Root and Fungus Control in Sanitary Sewers and Storm Drains," by John W. Hood, contains information published for the first time. This material includes actual methods for control and operating procedure. Here's the book that is a "must" for all sewage men.

GET EITHER OR BOTH OF THESE BOOKLETS ABSOLUTELY FREE— These two valuable booklets, so important to all water works and sewage men, are yours *without obligation.* Mail coupon below!

Write Today, Supply Limited!

PHELPS DODGE REFINING CORPORATION
40 Wall Street, New York 5, N. Y.

Please send my free copy of (check one or both):

☐ "Control of Microscopic Organisms"

☐ "Copper Sulphate for Root and Fungus Control in Sanitary Sewers and Storm Drains"

Name _____ Title _____

Employed by _____

Address _____

City _____ Zone _____ State _____

PW-5

tion. The American Baseball Congress felt that there should be at least one additional enclosed night-lighted park to facilitate handling of the games in as short a time as possible.

With the cooperation of the City Officials the Health and Recreational Association issued $35,000 in revenue bonds. The proceeds from the sale of these bonds were used to extend, fence and light the selected baseball field at Bailey Park, and provide the sanitary facilities and seating capacity required for some seven to eight thousand people. In addition the City of Battle Creek expended $28,770 on other necessary improvements in the area.

Constructing the Facilities

All of the work connected with this enterprise, with the exception of landscaping, was handled or performed by members of the Department of Public Works. The newly arranged ball diamond was put into service in July 1948. At the same time, the City acquired five additional acres of land adjacent to the park and this was leveled off and graded, and equipped with night lighting for the parking of approximately 400 automobiles. This was in addition to the park facilities already afforded by the previous park arrangement. The Health and Recreational Association has liquidated $14,000 of the bonds and the contract with the American Baseball Congress still has three years to run. By that time it is expected that the entire revenue issue of $35,000 will be paid off.

The City of Battle Creek also owned suitable frontage on an adjoining lake, called Goguac Lake. This lake, which has a splendid sand beach, is located in a fairly large park area called Willard Park. During 1949, the Department of Public Works was entrusted with the construction of a beach house and sanitary facilities for this area. At a cost of $35,000 provision was made to take care of some five to seven thousand people daily. This building was completed in 1949. The patronage from Battle Creek and surrounding territory during the past bathing season has indicated that this project will also be self-supporting. The facilities were opened on July 4, 1949 and over 8,000 people registered on that date. The beach house is constructed of tile and is equipped with full locker facilities. It has a seven-foot overhanging canopy the entire length of the front of the building. This not

(*Continued on page 77*)

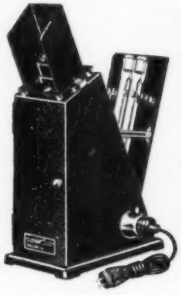
FOR ANALYSES OF WATER AND SEWAGE

HELLIGE POCKET COMPARATOR

With GLASS COLOR STANDARDS *perpetually* **guaranteed against fading**

The Instrument of Choice for Better pH Control — Through the combination of non-fading glass color standards and the durable Textolite housing affected neither by acids nor alkalis, the Hellige Comparator justifies its reputation for unlimited length of service and accuracy.

HELLIGE AQUA TESTER



For Accurate Analyses of Water, Sewage, and Industrial Wastes — Permanent glass color standards are available for all popular methods published by the American Public Health and American Water Works Associations. The most advanced model on the market by reason of its sound construction, simple operation, and guaranteed accuracy, the Hellige Aqua Tester is indispensable to the water laboratory.

HELLIGE TURBIDIMETER

For Turbidity Measurements and Sulfate Determinations — Foolproof and universal, this precise instrument does not require standard solutions and the simple operation permits anyone without special training to make determinations quickly and accurately. Turbidity measurements can be made down to zero turbid water.

HELLIGE

INCORPORATED

3718 NORTHERN BLVD.
LONG ISLAND CITY 1, N.Y.

DEMPSTER DIGGSTER Now Available With Two Types Of Traction

The revolutionary Dempster-Diggster, which is setting production records everywhere, is now available on crawler-type tractors as well as on the rubber-tired wheel type tractor. Both the rubber-tired and new crawler-type units feature the exclusive hydraulic crowd and hoist action that enables the Diggster to dig out the hardest chert bank . . . that permits digging 15 inches below and 15 feet above surface . . . that permits the bucket to follow the slope of the material in loading or stockpiling. Both units dig . . . load . . . bulldoze with equal efficiency.

If you're looking for a shovel that tackles big and small jobs alike with speed and economy of operation, your best bet is the Dempster-Diggster. It "spins on a dime" . . . loads and dumps faster . . . gets in those "hard-to-get-at" places . . . handles with a fingertip touch. For truck speeds on the road—to and from the job—it's the rubber-tired unit . . . for fast, efficient operation in difficult terrain, it's the new crawler-type unit. One of them is sure to fit your needs. Write today for complete information! A product of Dempster Brothers, Inc.

Photo above shows the new crawler-type Dempster-Diggster with 1 cu. yd. (heaped) digging bucket at its maximum hoisted position. Top photo at left shows the Dempster-Diggster rubber-tired unit digging out a 15 ft. bank of hard chert. Bottom photo at left shows the crawler-type unit ready to dump load into truck.

DEMPSTER DIGGSTER

DEMPSTER BROTHERS

950 Dempster Bldg. Knoxville 17,, Tenn.

4

important facts
that you should know about
swimming pools

If you are charged with responsibility in connection with the swimming pools of your community, you know that proper health standards must be maintained. The time to insure proper hygiene and safety for bathers, to provide a constant supply of clean water and correct drainage, and to secure maximum service from your pools is *before* you start construction. Make sure that these four facts play a prominent part in your pool plans:

1. THE POOL WATER AND CONTENTS SHOULD ALWAYS BE COMPLETELY RECIRCULATED

The Josam Injector Nozzle and Recirculating Supply Fittings guarantee continuous recirculation of over 90% of pool water, thus eliminating the possibility of "dead spots."

Josam Series 0700-B Injector Nozzle with recirculation feature

2. THE POOL SHOULD BE SAFEGUARDED AGAINST UNSANITARY CONDITIONS

Josam Promenade and Scum Gutter Drains accumulate and retain debris, preventing foreign matter from clogging lines and fouling equipment.

3. THE DRAINAGE SHOULD BE ADEQUATE, YET COMPLETELY SAFE

Josam Main Outlet Drains eliminate dangerous suction by allowing water from pool to drain slowly, but in sufficient volume to completely drain pool in 4 hours or less.

Josam Series 0490 Main Outlet Drain

4. THE POOL DESIGN SHOULD COMPLY WITH MODERN STANDARDS OF HYGIENE

You can meet modern standards of both hygiene and recreation by consulting local Architects or Engineers, and mailing the coupon below for Josam Manual SP on the latest facts and information covering water recirculation and drainage.

Josam Series 0670-B Scum Gutter Drain with Sediment Bucket

JOSAM MANUFACTURING COMPANY

MAIN SALES OFFICES, JOSAM BLDG., CLEVELAND 13, OHIO
MANUFACTURING DIVISION — MICHIGAN CITY, INDIANA

Representatives in All Principal Cities

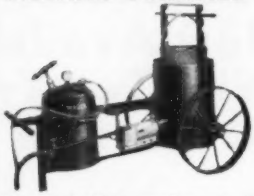
JOSAM MANUFACTURING CO.
335 Josam Bldg., Cleveland 13, Ohio
Please send me free copy of Josam Manual SP.

Name .....
Firm .....
Address .....
City and State .....

STANDARD OF THE WORLD

HAUCK Presents

PORTABLE LEAD MELTING FURNACE



Thawing Burner Equipment

Compound Melting Furnace

Lead Melting Furnace

Asphalt Tool and Cement Heater

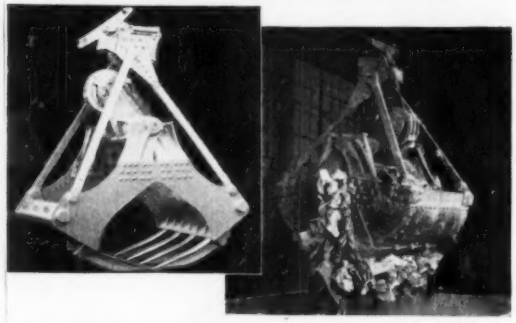
Asphalt Surface Heater

Melting Kettle

For lead, babbitt, spelter, etc. Fast! Melts 450 lbs. lead in 20 minutes, or 450 lbs. of babbitt in 18 minutes from cold start. Easy to wheel anywhere. Starts quickly, no waiting. "Slide rail" torch burner gives accurate heat control. Burns kerosene or furnace oil. Made in 200-, 450- and 850-lb. melting pot capacities. Write for Bulletin.

HAUCK MFG. CO.
117-127 Tenth St., Brooklyn 15, N. Y.

CLAMSHELL BUCKETS AND TINE TYPE GRAPPLES FOR INCINERATORS



Designing and Consulting Engineers: Bulletin 2247 contains a complete typical incinerator bucket specification. It illustrates and describes all three basic types of incinerator grabs — power wheel, lever arm clamshells and tine type grapples. Write today for copy.

BLAW-KNOX DIVISION
of Blaw-Knox Company
2124 Farmers Bank Bldg., Pittsburgh 22, Pa.

BLAW-KNOX INCINERATOR BUCKETS

When you need special information—consult READERS' SERVICE DEPT. *on pages 85-89.*

PUBLIC WORKS DIGESTS

WATER WORKS .. 59 • HIGHWAYS AND AIRPORTS.. 65 • SEWERAGE AND REFUSE.. 71

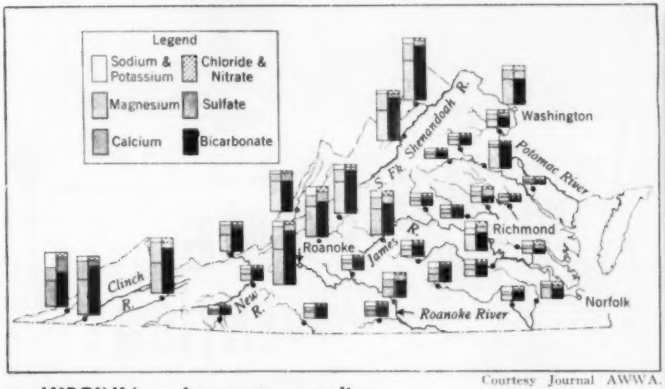
This section digests and briefs the important articles appearing in the periodicals that reached this office prior to the 15th of the previous month. Appended are Bibliographies of all principal articles in these publications.

THE WATER WORKS DIGEST

Water Quality in the Middle Atlantic States

The natural water supplies in the Middle Atlantic States are suitable for practically all municipal and industrial purposes. They are generally soft and low in dissolved solids. Most of the available surface and ground waters can be treated with relatively little expense to meet specialized water requirements. Many forms of pollution have threatened to ruin the natural sources of water in some thickly populated and heavily industrialized areas, but there is good reason to believe that the present national, state and local policies of pollution abatement will protect the country's greatest natural resource for future generations.

S. K. Love—"Water Quality in the Middle Atlantic States;" *Journal American Water Works Ass'n*, March.



Courtesy Journal AWWA.

● ***VIRGINIA surface water supplies.***

Water Tanks and Air Traffic Control

The Civil Aeronautics Administration has certain powers of control over high structures located in a strip 50 miles wide along the many civil airways of the country. It requires adequate notice of intent to construct in such a strip any structure rising more than 150 ft. above the ground; or, if located within 15,000 ft. of the nearest boundary of a landing area, if the top is more than 5 ft. above the ground for each 500 ft. of distance from such boundary. Waterworks officials contemplating the construction of an elevated tank should confer with the CAA representative in his region relative to location and, if it will present a hazard, the marking and hazard lighting of it. The former will generally consist of painting with international orange and white in alternate stripes. For lighting, the CAA will provide warning lights and control devices which will turn them on and off as the sky light indicates.

V. T. Guccione—"Is Your Elevated Tank Subject to Federal Air Traffic Control?"; *Water Works Engineering*, March.

Telemetering Applications

Telemetering reproduces, at a convenient location and primarily by electric transmission, values or quantities measured at a distant point. It may also include regulation, control, retransmitting, totalization and integration. Basic systems can be classified as "current", "voltage", "frequency", "position" and "impulse". For water works, current and impulse systems are the most widely adaptable. The current system adjusts the value of electric current to correspond to the measured quantity. One application utilizes an electronic method of regulating the line current, so that a minimum of moving parts is necessary in the transmitter. In the impulse system, the variable which is transmitted is a function of time rather than the quantity of electric current, so that wide variations in voltage current or line resistance have no effect on the accuracy of the readings. Of the systems offered in this category, the mechanical impulse duration group has a number of commendable features, including simplicity of principle, high fidelity of transmission through circuits not necessarily perfect, nonsynchronization of transmitter and receiver, and rugged construction.

At the Carlstadt pumping station of the Hackensack Water Co., two

pumps keep an elevated tank filled. By means of a selector switch and two pressure controllers set at high and low limits, one pump is started automatically, and the second if necessary, and both are stopped when the high limit is reached. If desired, the second pump can be started by remote control from the main office. Telemetering transmits to that office the elevated tank water levels and pressure in the main. At the Wood Ridge pumping station are two 4 mgd motor-driven units and one 4 mgd gasoline standby. A control panel contains two pressure controllers, and the transmitter for the station discharge pressures, transmitter measuring suction pressures, two pumping station recorders and a flow-meter measuring the discharge from the pumps; a delay device, pressure controllers of each of the motor driven pumps, and facilities for transmitting to the main office the suction and discharge pressures. Automatic control is provided by pressure controllers, surges being suppressed by hydraulic cone valves on the discharges.

A time-delaying device keeps the second pump from being energized until a present time after the first pump has started.

Joseph J. Domas and Adolph Damions—"Telemetering Applications in a Distribution System;" *Journal, American Water Works Assn.*, March.

Equipment For Pipe Laying

For trenching for pipe, two types of equipment available are the trench hoe on a power shovel, (including the "Gradall") and the trencher. A hydraulically operated trench hoe, ⅜ yd. capacity, rubber tired, road speeds 20 mph, which can load 18-ft. lengths of c.i. pipe and place it in the trench and has a bulldozer attachment for backfilling, is available for about $8,000. A "jeep-a-trench" trencher, costing about $4,000, digs a trench 10″ wide and 4½ ft. deep for a 6″ line. Other useful equipment is an air-operated clay spade, a pipe pusher or earth-boring machine, a truck-mounted winch or chain hoist. A blade side-mounted on a truck is handy for backfilling. Air-operated tampers are recommended.

J. G. Carns, Jr.—"Mechanical Pipe-Laying Equipment;" *American City*, April.

Measuring Water At Long Beach, Calif.

Long Beach has two sources of supply—27 wells and the Colorado river. To obtain accurate data on unaccounted for water, the supply from both sources is metered, and all customer use, both paying and non-paying, is metered. Water used by the several city departments is measured or computed; by pitot tube on hydrants or hose, by portable meters, etc. The amount so allotted to department use totaled 0.28% of the total supply in 1948-49. The unaccounted-for balance in 1948-49 was between 4% and 5%.

Well water is measured by impeller-type meters, which are tested at regular intervals with a Hall flow meter. If this shows an error exceeding 2 or 3% the meter is removed and repaired. If the error is less than this, a correction factor is applied to the readings. The river water is received through 12″ and 20″ mains, each of which is equipped with an impeller-type meter, which are checked for accuracy from time to time. Recently the metal impellers of these meters have been replaced with plastic ones. In the future, no impeller meters larger than 16″ will be used, Venturi type being used for

WE ARE LOOKING FORWARD to seeing you at the A.W.W.A. Convention to be held in Philadelphia from May 21 to 26. A most friendly welcome awaits you, and we hope that many of you will take the opportunity to get better acquainted with our products by visiting our plant in Florence, N. J., near Philadelphia.

At the Convention, our products will be on display in Booths 217 and 219. Come and see for yourself how simplicity of design and ease of replacement make the Modernized Mathews Hydrant a vital link in the fire fighting system of every modern, safety-minded community.

MATHEWS HYDRANTS

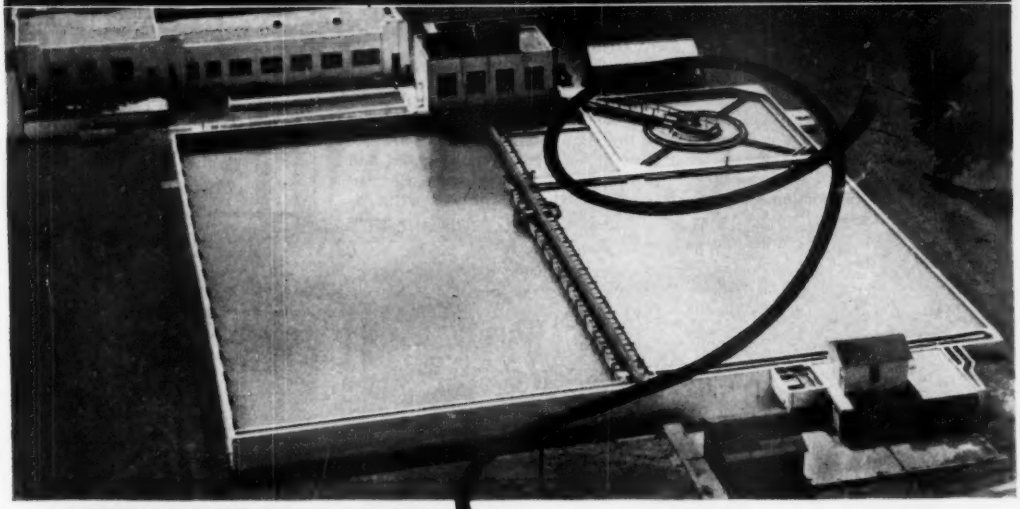
Made by R. D. WOOD COMPANY

Public Ledger Bldg., Independence Square, Phila. 5, Pa.

Manufacturers of "Sand-Spun" Pipe (centrifugally cast in sand molds) and R. D. Wood Gate Valves

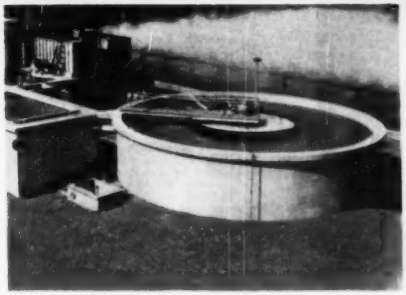
When you need special information—consult READERS' SERVICE DEPT. *on pages 85-89.*

HOW TO TURN AN EXISTING BASIN

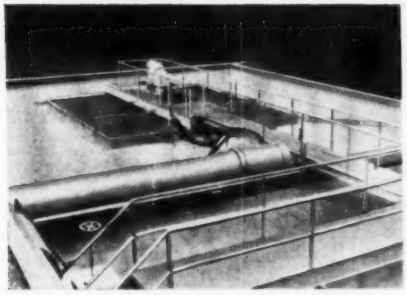


Into a Modern Water Conditioning Plant!

The ACCELATOR®
MAY BE ROUND OR SQUARE



ACCELATOR installations. (Above) City of Gainesville, Fla., (Below) City of Coshocton, Ohio.



At Muskogee, Oklahoma, a cyclone severely damaged the water treating plant. In rebuilding, they placed a *square* Accelator within the still-standing square settling basin. This saved the extra cost of building an external *round* basin. Today, the compact 70 ft. square ACCELATOR turns out 50% more clarified and softened water than the 210 ft. square settling basin did before! ★ Square, or round, the Accelator gives *any* municipality the means of converting turbid or hard water into a sparkling, clear, soft effluent. Over 1100 Accelator installations economically treat more than *One Billion* Gallons of water *every day!* Get all the facts.

SEND FOR..

our colorful new 28-page Bulletin No. 1825. It's packed with vital information about this better, more economical way to condition water.

INFILCO

• BETTER WATER CONDITIONING AND WASTE TREATMENT SINCE 1894 •

INFILCO INC.

GENERAL OFFICES: 325 WEST 25th PLACE • CHICAGO 16, ILLINOIS

SALES OFFICES IN TWENTY SIX PRINCIPAL CITIES

WORLD'S LEADING MANUFACTURERS OF WATER CONDITIONING AND WASTE TREATING EQUIPMENT

When writing, we will appreciate your mentioning PUBLIC WORKS

larger sizes; the shorter tube, with its greater head loss and lower cost, being used where there is abundant head.

For consumer services of 2″ and smaller, disc meters are used; for 3″ services, two 2″ meters; for 4″ and 6″ sizes, bronze-case compound meters; for larger sizes, batteries of 6″ meters. For combined fire flow and domestic or industrial service, a meter is installed which measures small flows accurately through a bypass meter, and fire flows are measured by a proportional meter through which a small percentage of the flow passes while most of it is unobstructed.

C. Kenyon Wells—"Long Beach Experience in Accounting for Water;" *Journal, American Water Works Assn.*, March.

Revitalizing Deep Wells

Deep wells in sand and gravel are apt to diminish in yield because of the formation of scale on strainer slots and the surrounding sand and gravel. In many cases this scale can be dissolved by treatment with diluted muriatic acid and removed by surging. In other cases Calgon is preferable, supplemented by calcium hypochlorite where iron-fixing bacteria are suspected. In rock wells where muriatic acid and Calgon are ineffective, dry ice has been used successfully to clean out the crevices and slots.

Robert B. Diehl—"Revitalizing Deep Wells;" *PUBLIC WORKS*, April.

BIBLIOGRAPHY

American City

Whether to Buy. By *J. G. Carns*, Jr., Am. W. W. Service Co. April, Pp. 96-97.

American Water Works Ass'n. Journal

Regulations Governing Water Service. By *W. C. Welmon*, Secy. So. Calif. Water Co., *John C. Luthin*, Supt. Water Dept., Santa Cruz, and *R. C. Kennedy*, Assist. Chf. Engr., East Bay Munic. Utility Dist. March, Pp. 209-227.

Column Life of Deep Well Pumps. By *A. O. Fabrin*, Chf. Engr., Layne & Bowler. March, Pp. 228-232.

Long Beach Experience in Accounting for Water. By *C. Kenyon Wells*, Asst. Gen. Mgr., Water Dept., Long Beach, Calif. March, Pp. 233-240.

California Practice in Accounting for Water. By *Oswald A. Gierlich*, Water Supt., Manhattan Beach, Calif. March, Pp. 241-244.

Water Waste Surveys and Unaccounted-for Water. By *E. D. Case*, Pres., Pitometer Co., March, Pp. 245-248.

Telemetering Applications in a Distribution System. By *Joseph J. Domas* and *Adolph Damiano*, Engrs., Hackensack Water Co. March, Pp. 249-256.

Water Quality in the Middle Atlantic States. By *S. K. Love*, U. S. Geological Survey. March, Pp. 257-265.

Financing Water Works Improvements in Florida. By *Townsend Wainwright*, Cons. on Mun. Finance. Pp. 266-270.

Development of Chester's New Water Supply. By *Francis S. Friel*, Cons. Engr. March, Pp. 271-276.

Operation and Maintenance of Small Water Systems. By *L. H. Lutz*, Supt. of Water, Ocala, *D. W. Jonas*, Supt. of Water, N. Miami, and *H. L. Berkstresser*, Supt. of Water Panama City, Fla. March, Pp. 277-282.

The Small-Scale Manufacture of Bleaching Power in Backward Areas. By *Ralph Stone*, San. Engr. March, Pp. 283-285.

Missouri Water and Sewerage Conference Journal

Shall a Public Water Supply Be Metered? In favor—*Roger C. Higgins*, Chem., Hannibal, Mo., and *Harry Hale*, W. W. Supt., Lamar, Mo. Opposed—*E. E. Easterday*, Engr., Water Div., St. Louis, Mo. and *A. W. Clarkson*, Engr., Marion, Co. Health Dept. October, Pp. 10-20.

New England Water Works Ass'n Journal

Progress Report on Chlorine Dioxide. By *R. N. Aston*, Mathieson Chemical Corp. March, Pp. 1-7.

Some Problems in Water Works Construction. By *Ralph H. White*, Contractor. March, Pp. 8-12.

Chicopee Valley Aqueduct. By *Stanley M. Dore*, Dep. Chf. Engr., Met. Dist. Com'n. March, Pp. 13-44.

Water Supply for the Logan Airport. By *George W. Coffin*, Cons. Eng'r. March, Pp. 45-71.

Algae Control and Method of Enumeration. By *Samuel O. Swartz*, Asst. Bacteriologist, Met. Dist. Com'n. March, Pp. 72-76.

Public Works

New Mixing-Settling Basins Produce Longer Filter Runs. By *Joseph L. Rose*, Com'r. Pub. Wks., Evanston, Ill. April, Pp. 36-38.

How a Water Supply Was Developed for an Air Base. By *C. T. Bagley*, Asst. Prof. of C. E., Univ. of Ill. April, Pp. 42-43, 50.

Revitalizing Deep Wells. By *Robert B. Diehl*, Diehl Pump & Supply Co. April, Pp. 48-50.

VISIT BUILDERS AT THE SHOW

AWWA Convention

May 21 through 26, Convention Hall, Philadelphia

A cordial welcome awaits you at our Booths 137, 139, 141, 143, 145 where Builders-Providence Water Works Equipment will be in full operation. Make Builders your headquarters while at the Convention! Builders-Providence, Inc. (Division of Builders Iron Foundry), 356 Harris Avenue, Prov. 1, R. I.

BUILDERS PROVIDENCE Instruments

When you need special information—consult READERS' SERVICE DEPT. *on pages 85-89.*

A Dresser-coupled steel line delivers water cheaper...

The cheapest way to deliver water to the place where it turns into revenue is with a Dresser-Coupled steel line—the line that:

- **Cuts installation costs**
- **Cuts leakage losses**
- **Cuts maintenance costs**

When you're fighting a water shortage, you want pipe and joints that go in fast, deliver *all* the water you pump. You want to lay up to 2,000 or more feet of pipe per day with each small crew, use a minimum of expensive heavy equipment and have the assurance of foolproof, *tight* joints. Steel pipe, Dresser-Coupled, gives you these advantages.

Add the benefits of modern, glass-smooth linings; tough, shatterproof, long-lived steel pipe, and flexible Dresser Couplings which *absorb* underground stresses—you have made an investment in permanence which will save you many thousands of maintenance dollars in the years to come.

Ask your Dresser Sales Engineer or write today for literature.

Near **SAN DIEGO, Cal.,** this 16", six-mile branch of the San Diego Aqueduct was laid fast to help relieve a drought-caused water shortage.

BE SURE **you get the best line at the best price. Put steel pipe and Dresser Couplings in your specifications.**

DRESSER "FLEXIBLE-TIGHT" COUPLINGS

Dresser Manufacturing Division, 59 Fisher Avenue, Bradford, Pa. (One of the Dresser Industries). In Texas: 1121 Rothwell Street, Houston. In Canada: 629 Adelaide St., West, Toronto, Ontario. Sales Offices: New York, Chicago, Houston, Philadelphia, San Francisco.

Technique de l'Eau

Calcul des Volume a Donner aux Reservoirs des Hydrophores. By *M. A. De Saedeleer*. March, Pp. 17-20.

Water and Sewage Works

Mobile Light-Weight Service Trencher. By *H. E. Lordley*, Asst. Dir., Dept. of Pub. Utilities, Richmond, Va. April, Pp. 155-156.

Fundamentals of Corrosion and Its Mitigation. By *E. W. Moore, W. H. Sears* and *L. Rubin*. N. E. W. W. A. Comm. on Corrosion. April, Pp. 157-160.

Honolulu's Water Supply. April, Pp. 161-162.

Operation and Maintenance of Water Wells. By *E. W. Bunnison*, Engr., Ed. E. Johnson, Inc. April, Pp. 163-166.

Water Works Engineering

Experience Shows Laying Mains in Alleys to be Unwise. By *A. H. Labrap*, Mgr. Water Dept., Longview, Wash. March, Pp. 206-207, 237.

Is Your Elevated Tank Subject to Federal Air Traffic Control? By *V. T. Guccione*, New York International Airport. March, Pp. 208-210, 246.

Aquatic Biology for the Water Works Engineer

(*Continued from page* 41)

trouble to be a source of legislative action.

Industrial wastes are diverse in biologic action. Some produce heavy growths of deleterious organisms—any waste having a high BOD belongs in this category. For example, distillery wastes produce enormous quantities of bacteria, and paper mill wastes tend to produce heavy growths of *Sphaerotilus*. Others—chromium wastes, leachings from exposed coal seams and steel mill pickle wastes—are extremely toxic. The biologic principle involved is an upset of biologic balance and any such upset is almost invariably bad. If we load a stream with sulfur-containing matter, we can expect a growth of H_2S producing bacteria and resultant outcry from people dwelling along the banks.

Advance knowledge of the probable biologic effects is wise and often profitable, for rectification may be costly or impossible. We no longer overload a stream with raw sewage, but is it much wiser to fertilize it so heavily that it produces microscopic weeds? Or to utilize a stream for water supply, whose plankton content is so high as to make it very expensive or almost impossible to treat for taste, odor or color?

There are distinctly bad aspects to the presence of profuse growths of algae, and it would be wise to investigate other supplies less liable to their occurrence. Though many new organic chemicals are being developed to kill specific growths such as poison ivy, water chestnut, diatoms, gnats or even fish, it should be ascertained that they are harmless to other organisms before they are used or they may cause as much trouble, by upsetting the stream balance, as they accomplish good.

Where the Aquatic Biologist Can Help

Before a source for a water supply is finally selected, it should be surveyed by a competent aquatic biologist in order to evaluate present and probable future biological conditions tending to affect the quality of the water. Reservoirs and storage facility plans should be reviewed by him to determine possible changes. Such work as the elimination of undesirable shallow areas can often be accomplished more cheaply during construction than these areas can be maintained after the reservoir is filled.

In areas where blooms or heavy growths of aquatic plants present an annual problem, a study by a qualified aquatic biolgist may indicate the causes for such growths and also methods of relief. If excessive growths occur and something must be done in a hurry, as is so often the case, the engineer or superintendent may call on a biologist from the nearest college or university. It may be too late at this stage for remedial measure, but identification of the growth and determination of the reasons for it may help in the future.

FORD

MONITOR COVERS

FIT 24", 30", AND 36"

METER PIT BARRELS

WRITE FOR CATALOG

Ford Catalog No. 50 contains full information. Send for your copy today. FREE.

For covering large meter pits the Monitor Cover is most useful. With lid opening large enough to permit meter reader to enter setting, this cover is used over pits containing 1½" or 2" meters, or multiple settings of smaller meters. An inner lid is available if extra frost protection is desired.

The cover is equipped with the Ford Lifter Worm Lock that opens lid easily, even when frozen.

FOR BETTER WATER SERVICES

FORD

Manufactured by THE FORD METER BOX COMPANY, INC.

Wabash, Indiana

When you need special information—consult READERS' SERVICE DEPT. *on pages 85-89.*

THE HIGHWAY and Airport Digest

PUBLIC WORKS DIGESTS

Rapid Construction Of Highway Bridges

Walla Walla County, Wash, in 1949 found that, in addition to the normal replacement of old bridges built of untreated timber, it had to replace 27 structures washed out by spring floods. These had to be replaced quickly and economically with material more permanent than the old timber bridges, which had an average life of 10 to 12 years. About 18 years ago it had built two bridges of pressure-treated timber, and these showed no sign of decay, so this material was adopted for replacement. Where possible, prefabricated culverts were used, provided with headers to decrease the length and protect the highway embankment. Types and spans were standardized, which permitted buying large quantities of pre-cut standard-length timber. A crew of 7 men with portable power plant, electric saw and drills, and a ½ yd. truck-mounted shovel equipped with crane boom and pile-driving leads and hammer, could excavate, drive piling and construct a bridge of 24 ft. span ready for traffic in three 8-hr. days, at an average cost of $90 per lineal foot of deck.

B. Loyal Smith—"We Built New Bridges—in a Hurry;" *Better Roads*, March.

Resurfacing Rough Streets

The 40-yr. old pavements of Enid, Oklahoma had worn thin and cracked but the old bases were still useful, though somewhat disintegrated, and it was decided to rejuvenate them by resurfacing with 2½" to 4" of asphaltic concrete of high Hveem stability design. This was laid in two lifts, of such thickness as to give a total minimum of 2". First a pavement was thoroughly cleaned by shovels, brooms and compressed air. The air blast slightly lifted poorly bonded portions of pavement, which were removed; as were any which showed distress when an 8-10 ton tandem roller passed over them. Holes and cracks were carefully patched. The surface was tacked with emulsified asphalt and a leveling course laid and checked with a 10 ft. straight-edge. Rolling was done with a 10-ton steel roller, followed by a pneumatic roller; the latter principally to produce a "traffic seal" for parking lanes, which receive comparatively little compacting by traffic.

An unusual practice was that employed in raising the manhole heads. When laying the new pavement, it was continued over the manholes, which permitted rolling the entire area. After the rolling had been completed, the paving was cut out in a clean, true circle 16" larger than the flange of the manhole head. The head was then lifted and blocked up to grade and the annular space around it filled with concrete.

J. Rogers Martin, V. G. Thompson and Smith Denman—"Asphaltic Concrete Resurfacing Eliminates Rough Streets;" *PUBLIC WORKS*, April.

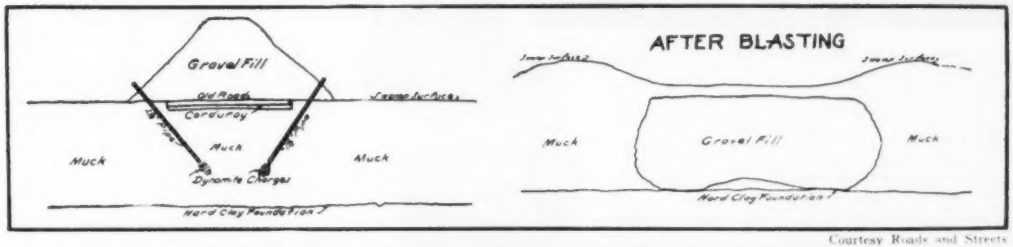
Dynamiting to Settle an Embankment

Carrying Route 202 across a bog in Maine about 1,000 ft. wide requires placing 60,000 cu. yd. of gravel and settling it through the muck 8 to 35 ft. to clay bottom. In some places a fill 15 to 20 ft. high settled out of sight over night, but over much of the distance settling was expedited by blasting. Five-foot sections of 1½" pipe were driven at an angle along the foot of the embankment at intervals of 8 to 12 ft. being "washed" down by pumping water through it by means of a 500 gpm trailer fire pump until it reached clay. Dynamite was then pushed down the pipe at the rate of one ½ lb. stick per cu. yd. of muck to be removed and the pipe is then drawn out. The largest blast was nearly 4 tons of 40% gelatin in a 400-ft. length of fill.

"Blowing the Muck"; *Roads and Streets*, March.

Traffic Line Paints

A committee of the Research Foundation of the Ontario Dept. of Highways has conducted tests on paints used for traffic lines. Some problems presented by experiences of highways engineers were: 1—Difference in consistency—thin paint caused fogging, thick paint caused handling and loading difficulties. 2—Settlement of paint in storage. 3—Methods of applying glass beads. 4—Field performance—discoloration, bleeding on bituminous surfaces, and traffic abrasion. Forty samples of paint, 11 of which were reflectorized, were received from manufacturers, and test stripes applied on both bituminous and concrete pavements; traffic counts averaging 1380 vehicles per day on the bituminous and 1085 on the concrete. After 15 weeks, over 80% of the paints on concrete failed completely; but after 20 weeks only a small percentage of those on bituminous pavement



Courtesy Roads and Streets

● ***DYNAMITING procedure to settle an embankment in muck.***

IT'S A REAL "GULLEY-WASHER" STANDARD STEEL FLUSHER

TRUCK MOUNTED FLUSHERS STREAMLINED FOR CIVIC PRIDE

T. F. TRACTOR FLUSHER CAN BE USED FOR FIGHTING FIRES AS WELL AS STREET CLEANING!

★ **MODERN TO THE MINUTE**
STANDARD STEEL FLUSHERS (both Tractor and Truck mounted) are built for heavy duty as well as "styled to the minute" like the finest motor cars!

★ **HI-TENSION STEEL THROUGHOUT**
STANDARD STEEL FLUSHERS are built of Hi-Tensile Steel—4 to 6 times less corrosive than blue annealed steel. Saves 15 to 20% dead weight.

★ **50 LBS. PRESSURE ON EACH NOZZLE**
You get a hurricane "GUTTER to GUTTER" wash from any Standard Steel Flusher. (Comes in both front and rear engine mounted.) The 350 G.P.M. Pump and 20 H.P. engine on the Tractor Flusher makes this equipment an excellent piece of auxiliary fire fighting equipment. Write for FLUSHER catalog today.

Built to the Highest Standard FL3

OTHER PRODUCTS
Asphalt Pressure Distributors, Maintenance Distributors, Tar Kettles, Patch Rollers, Supply Tanks, Tool Heaters, Asphalt Tools, Construction Brooms.

Standard Steel Works NORTH KANSAS CITY, MO.

Want to Save Money on Asphalt Mixing?

The Foote Kinetic Asphalt Mixer will give you 8 to 10 more batches from a barrel of asphalt. One user* has reported savings of $5.22 a ton. They used to buy their material for $10.50 a ton. Now they make it with the Foote Kinetic Asphalt Mixer for $5.28 a ton. $5.22 a ton is worth saving! Such a savings will soon pay for your Foote Kinetic Mixer.

You cannot compare the Foote Mixer with an ordinary concrete mixer either from the standpoint of construction or the finished product. Let us send you complete details. Ask for Bulletin K-100.

*Name on request.

- 3 cu. ft. in 30 seconds
- High output for low investment
- Handles any mix
- Fully portable
- New mixing principle gives you 8 to 10 more batches out of every barrel of asphalt

the FOOTE Kinetic mixer

THE FOOTE CO., INC.
Subsidiary of Blaw-Knox Co.
1954 State St., Nunda, New York

A BLAW-KNOX PRODUCT

had failed. The following tentative conclusions have been drawn: 1—Different types of paint should be specified for bituminous and concrete pavements, respectively. 2—While some reflectorized paints give high night reflectances, some are no better than ordinary paints. 3—The sizing of the beads in reflectorized paint has an effect on the night reflectance. 4—The field service test is an entirely satisfactory method for evaluating traffic paints.

John Walter—"Research Carried Out in Ontario on Highway Problems"; *Roads and Construction*, March.

New Soil Stabilizing Methods

The Army and Navy are studying new methods for stabilizing soils, the former in order to convert quickly an ocean beach, muddy road or soupy field into a stable, rubbery surface that will support movement of heavy vehicles and landing of aircraft. The Navy's aim is so to process sand soils that they will support fairly heavy vehicle loads 2 to 3 hrs. later. The latter uses furfural resin and aniline, which are mixed into the soil with a Seaman pulverizer and a P & H stabilizer, and the surface immediately struck off. The Army tests were made by mixing calcium ocrylate (not now commercially available) with the soil, then adding a compound of sodium thiosulfate and ammonium persulfate, which quickly solidified into a rubbery, elastic material and after 2-5 hrs. became rigid and concrete-like, but became rubbery again when soaked. The Army test strip withstood repeated passage of vehicle loads up to 35 tons. About 16 lb. of chemicals were used per sq. yd.

"Army-Navy Release New Data on Chemical Soil Stabilization"; *Engineering News Record*, March 16.

BIBLIOGRAPHY

Better Roads

Problems of America's Local Rural Roads. March, Pp. 21-22, 33.

We Built New Bridges in a Hurry. By *B. Loyal Smith*, County Engineer. March, Pp. 23-24, 44.

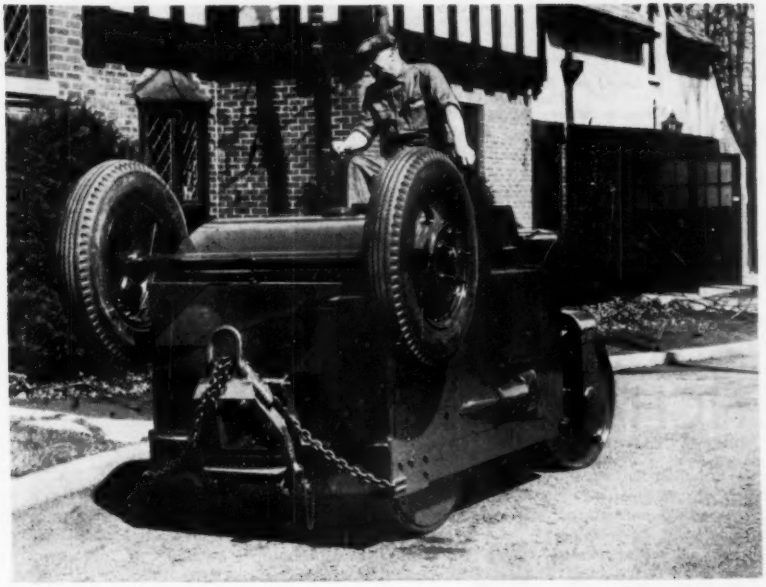
Is Resurfacing Worth the Cost? Forum letters from h'way engrs. March, Pp. 25-28.

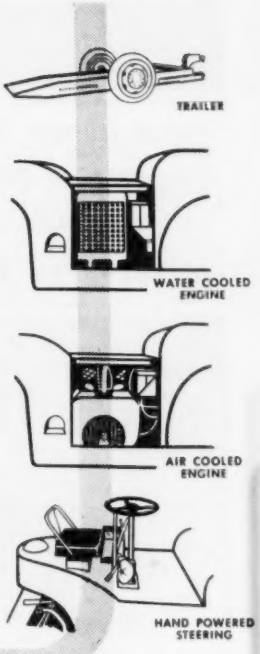
Contractors Record (England)

Road Curvature and Superelevation. By *J. J. Leeming*. April 5, Pp. 11-16.

Engineering News-Record

Army-Navy Release New Data on Chemical Soil Stabilization. By *Vincent B. Smith*. March 16, Pp. 23-24.





One Roller for 1000 Jobs!

That's a lot of work for a small roller—but Republic Asphalt Paving Company of Dayton, Ohio, completed exactly this volume of work during the 1949 season with their Buffalo-Springfield model KT-7, 3 to 5 ton tandem.

Used for patch work, driveways, parking lots and other small constructions, the KT-7 was quickly transported from job to job on its low-bed trailer. Now more portable than ever, when equipped with road wheels and husky towing attachment, the KT-7 can be completely rigged for hauling by one man in less than three minutes.

Available with either water-cooled engine and hydraulic steering or air cooled engine and hand powered steering, this unit is easily maneuvered in the most restricted areas. A shovel opening in the drive roll head permits the use of wet sand as ballast and accounts for the wide range of working weights attained with this small roller.

If you have a variety of smaller rolling jobs in widely-scattered locations, you can cut lost time between jobs and save working time on the job with this rugged, economical and easily maintained heavy-duty roller. Your nearest distributor can furnish detailed information on either the Model KT-7 or the smaller 2½ to 3-ton Model KT-6. Call him today.

BUFFALO SPRINGFIELD
SPRINGFIELD, OHIO

MAIL THIS COUPON TOAY
THE BUFFALO-SPRINGFIELD ROLLER CO.
Dept. G-5, Springfield, Ohio
☐ Please send me Catalog S-58-49 describing the right model for my requirements. ☐ Notify Distributor to call.

NAME .....
ADDRESS .....
CITY ..... STATE .....

When writing, we will appreciate your mentioning PUBLIC WORKS

Public Roads

Continuous Reinforcement in Concrete Pavements. By *Harry D. Cashell*, Research Engr., B.P.R., and *Sanford W. Benham*, Research Engr., Indiana State H'way Comn. April, Pp. 1-24.

Public Works

Asphaltic Concrete Resurfacing Eliminates Rough Streets. By *J. Rogers Martin, F. G. Thompson* and *Smith Denman*. April, Pp. 33-35.

How to Find the Practical Capacity of Streets. April, Pp. 40-41, 58.

Bituminous Resurfacing Solves Street Maintenance Problem. By *Patrick J. Foley*, Com'r of Pub. Wks., New Bedford, Mass. April, P. 51.

How Equipment is Used Effectively in County Highway Work. Replies in 500 questionnaires. April, Pp. 52-53, 56.

2-Way Radio Increases Highway Maintenance Efficiency. By *C. E. Brokaw*, Supt. H'way Maint., Cincinnati, O. April, Pp. 72, 74.

Roads and Construction

Research Carried Out in Ontario on Highway Problems. By *John Walter*, Research Engr., Ontario Dept. of H'ways. March, Pp. 118-123, 150.

Roads and Road Construction (England)

Soil Cement Stabilization. By *W. P. Andrews*. March, Pp. 68-70.

Low Cost Roads in Undeveloped Countries. By *R. S. Colquhoun*. March, Pp. 77-81.

Roads and Streets

"Blowing the Muck" (Swamp filling by blasting). By *A. R. Curtis*. March, Pp. 37-38.

Sloping Curb Removal in Iowa. By *C. L. Gleason*, Constr. Engr., Iowa State H'way Com'n. March, Pp. 40-42.

Triaxial Testing: Use of the Method in Road Design. By *Chester McDowell*, Sr. Soils Engr., Texas H'way Dept. March, Pp. 49-52, 88.

15 Years of Development in Soil-Cement Methods. March, Pp. 54-56.

U. S. 90, East Texas: Case Study in Roadway Modernization. By *R. E. Killmer*, Dist. Engr., Texas H'way Dept. March, Pp. 82-84, 86, 88.

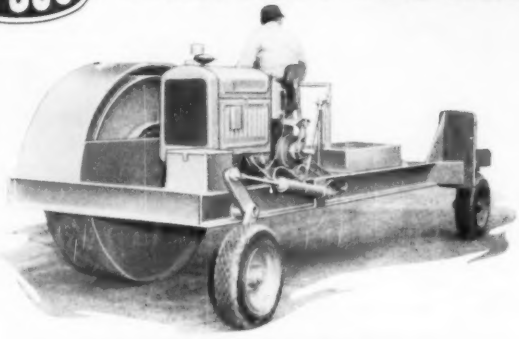
Tar Treated Gravel Roads. By *Geo. E. Martin*, Cons. Engr., Barrett Div., March, Pp. 94-87.

Cost Estimating for Bituminous Concrete. By *E. T. Nettleton*, Assoc. H'way Engr., Conn. H'way Dept. March, Pp. 99-103.

The Surveyor (England)

Experimental Asphalt Carpet Coats. By *W. Struthers*, Asst. City Engr., Plymouth. March 31, Pp. 187-188.

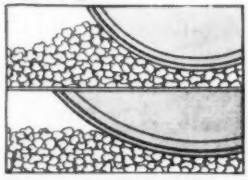
APSCO TRENCH ROLLER



Better 3 Ways

1. Higher, Heavier Compression Roll

Slightly exaggerated drawing illustrates how smaller diameter roll tends to push material ahead while larger roll exerts greater downward compression. Net result—few wavy spots, less reworking.



2. Improved, Hydraulic-controlled Leveling Wheel

(with pneumatic tire) keeps machine on even keel regardless of trench depth. A 3" hydraulic cylinder easily raises or lowers wheel to desired height. Here again, the pneumatic-tired wheel facilitates loading on highway trailer—makes transporting safer.

3. "Out-Of-Trench" Steering Wheel

Keeping steering wheel on the old pavement instead of in trench greatly improves control and performance. Much easier to get roller out of trench.

Send for free full line folder.

ALL PURPOSE SPREADER CO. Elyria, Ohio U.S.A.

When you need special information—consult READERS' SERVICE DEPT. on pages 85-89.

Sewage Treatment Operation Data from Liberty

HARRY EICHENAUER
Plant Superintendent, Liberty, N. Y.

WE STARTED our new digester (50 ft. in diameter, mixer-equipped) on April 28, 1949, taking all of the sludge out of the old No. 2 digester (35-ft. diameter) and putting it into the new one. When the supernatant started to overflow, that was run into digester No. 2. Beginning July 1, the start of our summer season, we drew sludge each week from the bottom of No. 1 (the new digester), and from No. 2 to the vacuum filter or sludge beds. So far, this program has worked very well. We get a clear supernatant from No. 2 digester and a thick, well-digested sludge. In fact, it sometimes seems too thick. That drawn at the end of the year contained 14% solids and 41% volatiles; it had no odor; pH was 7.6; and temperature was 27°C. It would not flow well enough to cover all of the sludge drying bed.

Adding lime to a digester has always seemed to me like a waste of time and money. We put our first heated digester into operation in 1940, and I added lime to it faithfully; but I could never see any change whether I added 50 pounds a day or 50 pounds a week. The pH changed little, if any, and there was never any difference in the supernatant, even after adding 50 pounds a day for two months.

Since July, 1948, I have not added lime, and the new digester has never had any lime at all. Last Dec. 16 (1949), the pH was over 7.6 (I have no color disc between 7.6 and 8.0); the temperature was 37°C; and the supernatant clear. In Sept., 1949, we averaged over 11,000 cu. ft. of gas per day.

The engineers of the State Department of Health were here recently when I was drawing sludge. Liking the looks of it, they asked

me how much lime I was using. I told them I had used none for a year and a half, and I told them only because they asked me. Not using lime was my own project and I had not previously told anyone about it.

So far, the vacuum filter is working well. We have five to ten visitors every time we run it; they call me, even late at night at home, to see if they can watch it operate. So far, we have no heat in the filter building and we do not run the filter very much. The last time I ran it, we got 18 cu. yds. of cake in 6½ hours of operation.

During 1949, sewage flow averaged 793,000 gallons per day, but was much lower in the winter and much higher in the summer. We pumped an average of 815 cu. ft. of primary and 415 cu. ft. of secondary sludge daily; and average 2.05 cu. ft. of screenings per day. From May 1 to Dec. 1, BOD of the raw sewage averaged 415 ppm and of the effluent 7.7 ppm, both based on 8-hour daytime composites. Average suspended solids were 324 ppm in raw and 5.9 ppm in the final effluent. Total solids in the raw were 757 ppm and in the final effluent 259.8 ppm.

New York Garbage Collection Practices

A survey of garbage collection practices in 153 cities in New York state shows that 42 per cent of the cities collect garbage with municipal forces, 33 per cent have their garbage collected by contract, and 25 per cent have private collectors. One of the cities which recently changed from private contract to municipal collection is Poughkeepsie. Private collection had become more and more inefficient and costly, the contract bid for last year being $174,000. The actual cost to the city for handling this service in 1949 was $130,000. Three out of every 10 cities covered in the survey incinerate their garbage, three dispose of it by dumping, two feed it to hogs, one disposes of garbage through the sanitary-fill method, and one out of 10 did not reply. Sixty-two cities pick up the garbage at the curb line and 51 cities report that employees take the garbage from the back yard. Detailed information concerning collection methods and frequency, the methods of final disposal, and pay rates is set forth in a report recently issued by the New York State Conference of Mayors, Albany, N. Y.—*Public Management abstract.*

Now Available . . Free of Charge

New 1950 Bulletin of

CORRECT INSECTICIDES

for use with

FOGGING EQUIPMENT

Drop us a post card or letter and get this up-to-the-minute fogging bulletin containing complete information and latest recommendations on insecticides for pest control and the insecticides recommended for specific locations and type pests.

SPECIAL—Information on the new CHEM-FOG 10-5-2 indoor concentrate eliminating involved mixing problems. Also 7 page folder giving 1950 recommendations on 2,4-D for regular weeds and 2,4,5-T for brush control including poison sumac, poison ivy, honeysuckle.

Don't delay! Write for this literature today! It's FREE.

CHEMICAL INSECTICIDE CO.

Dept. PW-1 57 - 13th Street

Brooklyn 15, N. Y.

KEEP IT CLEAN to KEEP IT SAFE!

SEWAGE DISPOSAL PLANT WALKWAYS and STAIRWAYS

REQUIRE

SAFE FOOTING

Irving grating walkway and stair treads in sewage disposal plant.

IRVING SUBWAY

(Open Grid)

PROVIDE MAXIMUM

GRATING and TREADS

- CLEANLINESS
- SAFETY
- DURABILITY
- ECONOMY

Catalog for the Asking

IRVING SUBWAY GRATING CO., INC.
ESTABLISHED 1902
HOME OFFICE and PLANT 5078 27th STREET
LONG ISLAND CITY 1, NEW YORK
WESTERN DIVISION FOOT OF PARK AVE.
EMERYVILLE 8, CALIFORNIA

When you need special information—consult READERS' SERVICE DEPT. *on pages 85-89.*

THERE'S 3 DEFINITE REASONS WHY YOU NEED THIS LITTLEFORD TRIPLE ACTION No. 101

Model No. 101
Utility Spray Tank using Hand Spray for Patch Work.

This Littleford No. 101 Utility Spray Tank is not only a Time Saver, Cost Saver and Road Saver, but it is a combination of three units rolled into one. It has a Spray Bar for small application jobs, a Hand Spray for patch work and a Pouring Pot Outlet for crack filling work. When the Littleford No. 101 is on the job, the road maintenance crew can do almost all road repairs with this one piece of equipment. The 101 is efficient in operation, saves time and money, its use on Roads, Streets and Highways saves our transportation system. Be modern, use Modern Littleford Equipment.

MANUFACTURERS OF

	"Spray Master" Pressure Distributors	
"Tankar" Steam Heaters	Highway Brooms	Asphalt Supply Tanks
"Kwik-Melter" Roofers Kettles	Tool Heaters	No. 101 Utility Spray Tanks
Trail-O-Rollers	Trail-O-Distributors	84-HD Asphalt Kettles

LITTLEFORD
BLACK TOP ROAD MAINTENANCE EQUIPMENT SINCE - 1900

LITTLEFORD BROS., INC.
452 E. Pearl St., Cincinnati 2, Ohio

increase filter capacity . . .
without
Expensive Plant Additions
install
PALMER FILTER BED AGITATORS
change to
ANTHRAFILT FILTER MEDIA

Hundreds of repeat orders from satisfied customers prove that longer runs at higher rates with less wash water consumption are absolute facts, not claims.

Try *Agitators* and *Anthrafilt* in one Filter and you too will eventually equip your entire plant.

For Information Call or Write

PALMER FILTER EQUIPMENT COMPANY
822 E. 8TH ST. — ERIE, PA.
PHONE 5-3416

MORE WATER PER GALLON of FUEL
With
GORMAN-RUPP
SELF-PRIMING CENTRIFUGAL
Lightweight Pumps

- **SUCTION LIFT** — up to 30 feet at sea level.
- **FAST AUTOMATIC PRIMING**—no ports or valves. Just start the pump and you start the water.
- **PORTABILITY** — The Handy Pump Electric Motor Driven weighs only 20 lbs. Midget 62 lbs.—Hawk 110 lbs. —Eagle 117 lbs. Provided with carrying handles.
- **NON-CLOGGING** — Any muck or solids that clear the intake strainer will pass through the pump.

Write for Bulletin 7-LW-13

HANDY PUMP, ¾ in. Electric 1000 GPH Max.

MIDGET, 1½ in. 5500 GPH

HAWK, 2 in. 9000 GPH

EAGLE, 3 in. 16,500 GPH

Gorman-Rupp pumps are made in all sizes up to 240,000 GPH to cover any requirement. Inquiries invited related to your pumping problems.

THE GORMAN-RUPP COMPANY
MANSFIELD, OHIO

When you need special information—consult READERS' SERVICE DEPT. *on pages 85-89.*

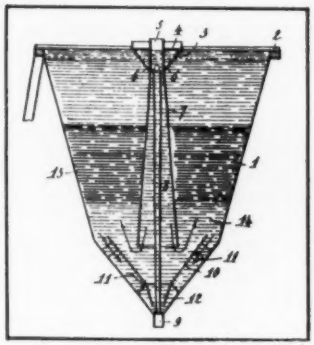
THE SEWERAGE and Refuse Digest

PUBLIC WORKS DIGESTS

Notes on Treatment Equipment

Coarse Screens. Wear and tear, maintenance, and operating costs are almost directly proportional to the hours of operation; therefore intermittent operation of the rakes is desirable. *Screenings grinders.* It is desirable in some cases to discharge the screenings upon a sorting table, from which metallic and bulky materials can be removed prior to grinding, and the screenings fed by hand at the desired rate. Screenings from the racks at the plants at Los Angeles and Boston are carried by part of the sewage flow to comminutors. *Grit Chambers.* Grit chamber equipment is subjected to a high rate of wear, and the construction should be rugged, durable, and worn parts readily replaced. For transporting grit, belt conveyors operate with less maintenance costs than scraper or spiral conveyors. Removal of grit by water-jet pumps eliminates wear and tear on grit collecting mechanism and produces clean grit without special washing mechanism. *Sedimentation tanks.* Sludge collecting equipment for rectangular tanks is highly competitive, and in order to insure satisfactory operation and long life, it is necessary to specify the equipment in considerable detail. Instead of multiple sludge hoppers, it is preferable to provide a single transverse hopper with a cross-collector. It is believed desirable to specify sprockets of cast iron with 1.00% to 1.25% nickel and 0.45% to 0.65% chromium, chilled; and rugged, durable chains with hardened steel pins. Readily renewable wearing shoes on the flights are desirable. *Chlorinators.* Substantial savings in cost of chlorine should be possible in the larger plants with programmed automatic control of chlorine feed. *Sludge digesters.* Accumulations of masses of relatively inert scum can generally be avoided by keeping it mixed with the tank liquor by one of several devices available. *Vacuum filters.* Considerable trouble and expense have been caused by corrosion of vacuum filter equipment dewatering ferric chloride-conditioned sludge, and it seems advisable to specify Everdur bronze screens, staples, division strips, etc. For interior pipes and fittings it would appear that plastic materials such as Saran or Uscolite are suitable. Recent developments in the cord and spring-wound filters are promising.

Frank L. Flood—"Mechanical Equipment in Sewage Treatment;" *Sewage and Industrial Wastes,* March.



Courtesy Water & Sewage Works

● ***A 1909 type clarifier.***

Sampling Industrial Wastes

A sample of waste-transporting water taken for the purposes of analysis should be representative. Too often we concentrate our efforts on reducing errors in analysis from 0.2 to 0.15% while blithely ignoring errors of 10 to 20% in sample collection. Sampling errors may result from how the sample is taken, where it is collected, or the method of compositing.

To obtain a representative sample, we must consider the following questions:

1. Is the sample intended to reflect average or spot conditions?
2. Do the volume and composition of the waste water fluctuate widely or not?
3. Are such variations in composition periodic or random?
4. Where in the waste-water flow route should the sample be obtained?
5. Is the waste water homogeneous at the sampling point?
6. How long should the sample lines be purged before the sample is taken?
7. Is it necessary to preserve the sample and how can this be accomplished?
8. How much sample will be needed to make the analyses desired?

Charles F. Hauck—"Sampling Industrial Wastes;" *PUBLIC WORKS,* April.

The Sludge Blanket Clarifier

The author cites the Dortmund tank (Germany, 1880) as the "earliest known sludge blanket clarifier;" a development of which was installed at the Chicago World's Fair in 1893. However, it was not until 1934 that much was done toward developing the idea for modern plants, but since then there has been considerable activity by a number of manufacturers, at least 40 U. S. patents being listed in the article. "It is obvious that 'accelerated precipitation,' with the aid of recirculated sludge, has come into its own after long delay during the early part of this century." He discusses the Spaulding Precipitator, the Rectangular Precipitator of Montgomery & Aultman, the Accelator of Infilco, the Reactivator of Spaulding, the Reactor of Cochrane, Dorr's Hydro-Treator, Chain Belt's Verti-Flo, and Strati-Flo, the Clariflow of Walker Process Equipment, and the Flocsettler of American Well Works.

Frank D. Prager—"The Sludge Blanket Clarifier;" *Water & Sewage Works,* April.

Boston's Planned Treatment Plant

Boston, Mass., is beginning construction of an $8,000,000 treatment plant designed to treat an average dry- weather flow of 74 mgd. It will include coarse and fine bar screens, grit chambers, pumping station, aeration channels, settling tanks, chlorination facilities, sludge digestion tanks, high and low-pressure gas holders, waste gas burners, Venturi meter and effluent control. The two coarse bar screens have 4" clear openings cleaned by a traveling rake. Four fine bar screens have 1"

openings, with mechanical cleaners designed for periodic operation by float control, with a screenings grinder behind each screen. At the downstream end of each of the six grit chambers is a Camp type regulator for velocity control. There are six pumps, three driven by supercharged dual-fuel engines and three by motors, float controlled to provide variations automatically in pumping rate. Aeration for grease separation is provided through swing-type diffusers in channels with 10 ft. water depth. Three settling tanks 210 ft. long with 15 ft. water depth will furnish over 1.5 hr. detention period at average flow. Meider type sludge and scum removers will deliver the sludge to cross-collectors at the influent end, and scum to the effluent end, where cross-collecting mechanisms will deliver it to pneumatic ejectors for transfer to a receiving tank atop the digester control house. From this house the scum can be delivered either to the digesters or to tank trucks for conversion to low-grade grease. Settling tank effluent will be chlorinated and discharged into one or both of two existing outlet tunnels which discharge into the harbor. Four digesters, 75 ft. in diameter and 25 ft. deep, will give a total capacity of 0.9 cu. ft. per capita and a 25-day digestion period. Two-stage digestion, recirculation of tank contents, and external sludge heat exchangers are provided for. A unique feature is two digested-sludge storage tanks with mixers, in which sludge from the secondary digesters can be concentrated, when it will be pumped through 19,000 ft. of 8" pipe to a point of discharge well out in the harbor.

John F. Flaherty—"Sewage Treatment and Disposal for Boston"; *Sewage and Industrial Wastes*, March.

Patents in Municipal Contracts

Scheduled for completion in June 1950 is a 300-ton incinerator contracted for by Arlington County, Va. Bids had been asked for either a hand-stoked rectangular furnace or a mechanically stoked cylindrical furnace. The Nichols "Monhearth" was the only furnace which met the specifications for the second type when they were prepared, but another make of this type had been placed in service 3 months before bids were submitted, and this also was bid upon. However, because of the brief experience of the latter in actual service, the County selected the Monohearth, although its bid was somewhat higher. The other company contested the award in the Courts up to the Supreme Court of Appeals, which decided against the petitioner. Among the reasons given by the Court were the following:

Said the Court: "The fact that there could be only one bid for that type did not make competition impossible. It could be and was made to compete with the hand-stoked type." The Court held that even in cases where competitive bidding is a statutory requirement, the use of patented articles is not prejudiced, thus: "The security of the City against combinations and extravagant contracts in such cases must rest in the power which the common council possess to reject any bid which they might regard as unreasonable." "Public bodies might be prevented from availing themselves of new inventions and required to depend upon the cobblestones of our forefathers."

The specifications clearly reserved to the County the right to reject any or all proposals and to accept the one that in its judgment best served the interests of the

PIPE CLEANING TOOLS

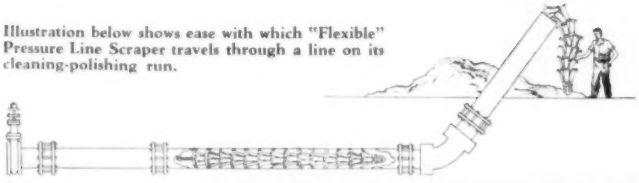
FOR WATER LINES

"FLEXIBLE" PRESSURE LINE SCRAPERS

Available in sizes from 6" to 36" in diameter. These tools are pushed through mains by water pressure. Designed to travel long distances and to clean pipe thoroughly at low cost.

"FLEXIBLE" SeweRodeR

Illustration below shows ease with which "Flexible" Pressure Line Scraper travels through a line on its cleaning-polishing run.



FOR SEWER LINES

The Rodding Robot

The machine built to take the *work* out of cleaning sewers! By means of three simple controls an operator can bore and push into obstructions and pull out as well.

Positive action. No rod slippage. Footage meter standard equipment. Adds work speed to the budget.

"FLEXIBLE"

UNDERGROUND PIPE CLEANING CO. SEWER-ROD EQUIPMENT CO.

9059 VENICE BOULEVARD, LOS ANGELES 34, CALIFORNIA

141 W. Jackson Blvd. Chicago, Ill. | 401 Broadway New York 13 | 147 Hillside Ter. Irving, N. J. | P. O. Box 165 Atlanta | P. O. Box 465 Memphis, Tenn. | 801 E. Excelsoir Blvd. Hopkins, Minn. | 29 Cerdan Ave. Roslindale 31, Mass.

Box 167 Los Nietos, Calif. | 41 Greenway St. Hamden, Conn. | 3786 Durango Ave. Los Angeles 34, Calif. | 709 House Bldg. Pittsburgh 22, Pa. | 4455 S. E. 24th Ave. Portland 2, Ore. | P. O. Box 447 Lancaster, Texas

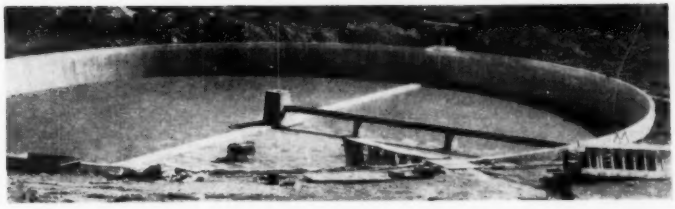
When you need special information—consult READERS' SERVICE DEPT. on pages 85-89.

TODAY'S FILTER PLANTS : *use vitrified clay filter bottom blocks*

PLACE: **MARIETTA, GA.**

ENGINEER: **MERRITT & WELKER**

Alan P. Welker



26,640 sq. ft. of filter bottom blocks being laid at Marietta, Ga. by Arthur Pew Construction Co. of Atlanta

The East Side Disposal Plant for the City of Marietta is a standard rate Trickling Filter of 1 mgd capacity. It consists of a bar screen, grit chamber, 2 rectangular primary tanks, each 60' x 15', 2 secondary tanks of the same size, 2 130' 6" filters, and 7' deep, one 54' digester, 4 sludge drying beds, 2 Duplex Plunger sludge pumps and one control building.

The raw sewage has a 5 day B.O.D. of 300 ppm. It is expected that the effluent will contain 30 to 45 ppm.

A standard rate trickling filter type plant was chosen because of the small summer flow in the receiving stream falls. Complete nitrification was desired. The plant is designed with a 2½ hour detention period in primary and secondary settling tank, based upon a 24 hour average flow, and the trickling filters have a loading of 400 pounds B.O.D. per acre foot.

Today filters are built with underdrains of *Vitrified Clay Filter Bottom Blocks* because engineers everywhere recognize their value in insuring best operating results. These blocks are scientifically designed with smooth, non-clogging channels for rapid flow. Large top openings give adequate ventilation at all times. Anybody can lay them. On *your* next filter job, specify these top quality blocks to be sure of best operating results.

Write for latest engineering data now.

MERRITT & WELKER

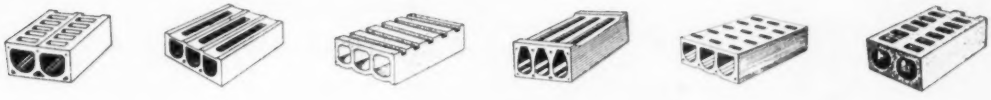
The firm of Merritt & Welker, Engineers, was organized in November, 1944, engages primarily in the design and supervision of sewer and water systems and plants, and road construction.

Among others, they have designed and completed a standard rate trickling filter plant for the city of Smyrna, Ga., 250,000; an intermittent sand filter plant, cap. 150,000 for the State Board of Education; a primary treatment plant for the City of Tallapoosa, Ga., cap. 500,000.

At present, they are making plans for a $500,000.00 extension to the present Cobb County Water System. They are making plans for re-vamping and extending the Acworth, Ga., Sewer System and constructing a primary treatment plant with a capacity of 250,000 gallons per day.

SPECIAL FEATURES: **EASY TO LAY** **WON'T CLOG** **PROVED BY USE** **RESISTS ACIDS**

Bosco Pomona Tranlot Natco Dickey Armaro



TRICKLING FILTER FLOOR INSTITUTE

AYER-McCAREL-REAGAN CLAY CO. Brazil, Ind. | NATIONAL FIREPROOFING CORP. Pittsburgh 12, Pa. | BOWERSTON SHALE CO. Bowerston, Ohio | POMONA TERRA-COTTA CO. Pomona, N. C. | TEXAS VITRIFIED PIPE CO. Mineral Wells, Tex. | W.S. DICKEY CLAY MFG. CO Kansas City 6, Mo.

County. On this provision the Court said "Such a reservation is generally held to vest in the authorities a wide discretion as to who is the best as well as the lowest bidder, and this involves inquiry, investigation, comparison, deliberation, and decision which are quasi-judicial functions, and, when honestly exercised, may not be reviewed by the Courts." On the subject of the duties of public works awarding authorities, it is of interest to note the remarks of the Court that "it is not a ministerial act but one involving the highest discretion."

M. H. Klegerman—"Arlington's 300-Ton Incinerator;" *Sewage and Industrial Wastes Engineering*, April.

BIBLIOGRAPHY

American City

Dual Fuel Engines Gain Favor in Sewage Treatment Plants. April, Pp. 88-89.

The Garbage Grinder in Municipal Sanitation. April, Pp. 106-107.

New Incinerator Design Standards Set in World's Largest Plant. April, Pp. 108-110.

Civil Engineering

New York Builds Incinerator With 800-Ton Daily Capacity. By *Frederick H. Zurmuhlen*, Com'r. Dept. of Pub. Wks. April, Pp. 17-21.

Cincinnati Plans Pollution Drive. By *H. H. Kranz*, City Engr. April, Pp. 40-41.

Engineering News-Record

The Design of Contact Aeration Plants. By *Llewellyn B. Griffith*, Cons. Engr. March 16, Pp. 38-39.

A Sound Program for Sewage Treatment. March 30, Pp. 32-33.

Public Works

A Modern Sewage Plan Designed for a Small Community. By *Charles Lose*, San. Engr., Am. Cyanamid Co. April, Pp. 38-39.

Sampling Industrial Wastes. By *Charles F. Hauck*, Hall Laboratories, April, Pp. 44-45.

Garbage and Refuse Collection and Disposal. April, Pp. 67-68.

Sewage and Industrial Wastes Engineering

Arlington's 300-Ton Incinerator. By *M. H. Klegerman*, Cons. Engr. April, Pp. 199-201, 220.

Eight Pilot Plants Give Data on Paper Mill Waste Treatment. By *Harry W. Gehm*, Tech. Advisor, Nat'l. Council for Stream Imp. April, Pp. 202-203, 222.

Insulating Sludge Digestion Tanks. By *Morris M. Cohn*. April, Pp. 215-216.

Sampling Industrial Wastes. Abstract of an article by *Chas. F. Hauck*, Hall Laboratories. April, Pp. 44-45.

Sewage and Industrial Wastes

Sewage Treatment and Disposal for Boston. By *John F. Flaherty*, Sr. Civ. Engr., Sewer Div., Boston. March, Pp. 277-288.

Reclamation of Water from Sewage and Industrial Wastes in Los Angeles County. By *Russell G. Ludwig*, San. Engr. March, Pp. 289-295.

Maintenance and Operation of Metropolitan Boston Sewers. By *Thomas A. Berrigan*, Chf. Engr., Boston Met. Sewer Div. March, Pp. 296-306.

Mechanical Equipment in Sewage Treatement. By *Frank L. Flood*, Cons. Engr. March, Pp. 307-317.

Biochemical Oxidation of Dairy Wastes: 1—Methods of Study. By *Nandor Porges, Janet B. Pepinsky, Nancy Hendler and Sam R. Hoover*, U. S. Dept. of Agriculture. March, Pp. 318-325.

Character of Waste Oil Emulsions. By *David Milne*, Chem. Engr. General Motors Corp. March, Pp. 326-330.

Extended Use of Oil Emulsions to Minimize Disposal Problems. By *M. A. Pratt*, Plant Engr., General Motors Corp. March, Pp. 331-335.

The Effect of Chromium on the Methane Fermentation of Acetic Acid. By *J. F. Pagano, Ruth Teweles* and *A. M. Buswell*, Illinois State Water Survey. March, Pp. 336-345.

Bacterial Standards for Natural Waters. By *Abel Wolman*, Prof. of San. Eng., Johns Hopkins Univ. March, Pp. 346-355.

To Lime or Not to Lime. Forum discussion. March, Pp. 357-362.

Starting the Operation of the Abington Township Sewage Treatement Plant. By *R. M. Bolenius*, Chem. of treat. plant. March, Pp. 365-371.

South African Municipal Magazine

Sewage Disposal in Sub-Tropical Countries. By *E. J. Hamlin*, City Engr., Johannesburg, S. Africa. January, Pp. 21, 23, 25.

The Surveyor (England)

Relation of Storage to Storm-Water Pumping Rate. By *L. B. Escritt*. March 3, Pp. 127-129.

Mechanical Plant and Mechanization on a Sewage Works. By *S. C. Evans*. March 10, Pp. 141-143.

Sewerage and Sewage Disposal in 1949. March 10, Pp. 145-148; March 17, Pp. 159-160; March 24, Pp. 173-174.

Utilization of Organic Domestic Wastes. Discussion of paper reviewed in Sewerage Digest for December, 1949. March 17, Pp. 161-163.

Design of a Network of Surface Water Sewers Without Recourse to Graphical Aid. By *H. G. Brind*, March 24, Pp. 167-168.

Water and Sewage Works

The Sludge Blanket Clarifier. By *Frank D. Prager*, patent attorney. April, Pp. 143-152.

Modern Wastes Treatment Plant (for carpet mill). By *Stuart E. Coburn*, Metcalf & Eddy Engrs. April, Pp. 167-171.

Pilot Plant Tests on High-Rate Biological Oxidation of Sewage. By *A. A. Kalinske*, Infilco, Inc. April, Pp. 175-178.

B.O.D. or C.O.D.—A Commentary. By *Geo. A. Rhame*, San. Engr., So. Car. Bd. of Health. April, Pp. 179-181.

3 QUICK STEPS TO INSTALL

UNIVERSAL* CAST IRON PIPE

1. Assemble Pipe in Position.
2. Insert 2 Bolts in Lugs.
3. Tighten Bolts with Ratchet Wrench.

* Reg. U. S. Pat. Off.

2 inch and most other sizes through 16 inches available for prompt shipment. Save time, labor and money by specifying Universal Cast Iron Pipe. Write today for catalog and information to Department C.

THE CENTRAL FOUNDRY COMPANY

386 FOURTH AVE. - NEW YORK 16, N. Y.

TIGHT Joints In A Matter Of Minutes

When You Use McWANE 2 Inch Threaded Joint CAST IRON PIPE

The pipe has over size extra strong 2½ threads. Use McWane 2" cast iron pipe.

McWANE CAST IRON PIPE CO. BIRMINGHAM, ALA.

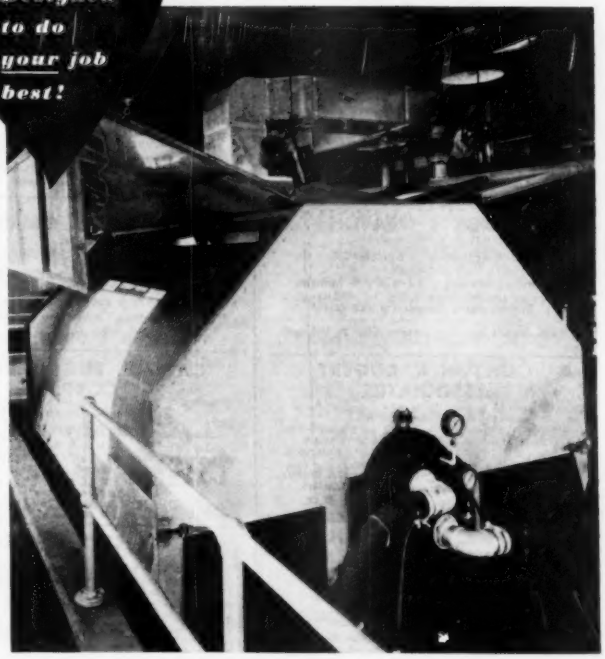
"Just screw 'em together."

McWANE 2" CAST IRON PIPE

See
General American for
CREATIVE
FILTER
ENGINEERING

For better filtration at lower cost... municipalities and industries specify Conkey Sludge Filters

Designed to do your job best!



What's your sludge dewatering problem — primary directly handled *or* digested *or* digested and elutriated, activated with the same handling, chemical treatment or special process, *or* is it a trade waste? No matter what its specific nature, Conkey Sludge Filters are engineered, built and installed to do the job better, more economically.

Rapid, continuous, automatic sewage sludge dewatering is the aim of all progressive sanitary engineers. Conkey filters with their superior drainage design, their improved mechanical construction, and their advance selection of materials of fabrication fulfill these aims in the most perfect manner.

No wonder the Sanitary District of Chicago, and the sewage engineers of many other cities have selected Conkey Sludge Filters for their new plants. Your engineering files should contain a copy of our Bulletin No. 100 that gives more complete information. Write for it now.

Other General American Equipment:
Turbo-Mixers, Evaporators, Thickeners, Dewaterers, Dryers, Towers, Tanks, Bins, Kilns, Pressure Vessels

OFFICES IN ALL PRINCIPAL CITIES

PROCESS EQUIPMENT DIVISION
GENERAL AMERICAN
TRADE MARK

Process Equipment Division
GENERAL AMERICAN
Transportation Corporation
Sales: 10 East 49th Street, New York 17, New York
General Offices: 135 S. La Salle St., Chicago 90, Ill.

When writing, we will appreciate your mentioning PUBLIC WORKS

★ DIRECTORY ★
OF
CONSULTING ENGINEERS

ALBRIGHT & FRIEL, Inc.
Consulting Engineers
WATER, SEWAGE & INDUSTRIAL WASTE PROBLEMS, AIRFIELDS, REFUSE INCINERATORS & POWER PLANTS
INDUSTRIAL BUILDINGS
CITY PLANNING REPORTS
VALUATIONS LABORATORY
121 South Broad St. Philadelphia 7, Pa.

Charles B. Burdick Louis R. Howson
Donald H. Maxwell
ALVORD, BURDICK & HOWSON
Engineers
Water Works, Water Purification, Flood Relief, Sewerage, Sewage Disposal, Drainage, Appraisals, Power Generation
Civic Opera Building Chicago

BANISTER ENGINEERING CO.
Consulting Engineers
POWER PLANTS, WATERWORKS, CITY PLANNING, RURAL ELECTRIFICATION, SANITATION, WASTE PROBLEMS, AIRPORTS, STREET IMPROVEMENTS
1549 University Ave.
St. Paul 4, Minn.

BARKER & WHEELER
Engineers
Water Supply, Sewerage, Sewage Disposal, Power, Public Utility and Industrial Valuations and Rates
36 State Street, Albany 7, N. Y.
11 Park Place, New York City 7

BLACK & VEATCH
Consulting Engineers
Water — Sewage — Electricity — Industry
Reports, Design, Supervision of Construction Investigations, Valuations and Rates
4706 Broadway Kansas City 2, Missouri

CLINTON L. BOGERT ASSOCIATES
Consulting Engineers
Clinton L. Bogert Ivan L. Bogert
J. M. M. Oreig Robert A. Lincoln
Donald M. Ditmars Arthur P. Ackerman
Water and Sewage Works
Refuse Disposal Industrial Wastes
Drainage Flood Control
624 Madison Ave., New York 22, N. Y.

BOWE, ALBERTSON & ASSOCIATES
Engineers
Sewerage — Sewage Treatment
Water Supply — Purification
Refuse Disposal — Analyses
Valuations — Reports — Designs
110 Williams St. New York 7, N. Y.
2082 Kings Highway Fairfield, Conn.

BROWN ENGINEERING CO.
Consulting Engineers
Waterworks, Sewage Disposal, Airports
Street Improvements, Power Plants
Electric Distribution, Rates
K. P. BUILDING DES MOINES, IOWA

BUCK, SEIFERT AND JOST
Consulting Engineers
(FORMERLY NICHOLAS S. HILL ASSOCIATES)
Water Supply Sewage Disposal
Hydraulic Developments
Reports, Investigations, Valuations
Rates, Design, Construction, Operation
Management, Chemical and Biological Laboratories
112 East 19th St. New York City

BURGESS & NIPLE
Consulting Engineers
Established 1908
Water supply, treatment and distribution
Sewage and industrial wastes disposal
Investigations, reports, appraisals, rates
Airports, Municipal Engineering, Supervision
584 E. Broad Street Columbus 15, Ohio

BURNS & McDONNELL ENGINEERING CO.
Consulting Engineers — 50th Year
Waterworks—Water Purification—Sewerage
Power Plants—Steam—Diesel—Hydro
Electric Systems—Rate Reports—Valuations
Refuse & Industrial Waste Disposal
Box 7088 Country Club Station
Kansas City 2, Missouri

JAMES M. CAIRD
Assoc. Am. Soc. C. E.
Chemist and Bacteriologist
Water Analysts and Tests of Filter Plants
Office and Laboratory
Cannon Bldg., Broadway & 2nd St.
Troy, N. Y.

CAPITOL ENGINEERING CORP.
Engineers—Constructors
Management
Water Works Sewage Systems
Design and Surveys Roads and Streets
Planning Airports
Bridges Dams
Executive Offices
DILLSBURG, PENNSYLVANIA

THE CHESTER ENGINEERS
Water Supply and Purification
Sewerage and Sewage Treatment
Power Developments and Applications
Investigations and Reports
Valuations and Rates
210 E. Park Way at Sandusky
Pittsburgh 12, Pa.

MICHAEL BAKER, JR., INC.
The Baker Engineers
CIVIL ENGINEERS — PLANNERS AND SURVEYORS
Pipe Line Surveys — Municipal Engineers — Airport Design — Sewage Disposal Systems — Water Works Design and Operation — Surveys and Maps — City Planning — Highway Design — Construction Surveys
HOME OFFICE: ROCHESTER, PA.
Branch Offices
Jackson, Miss. Harrisburg, Pa.

Anthrafilt for Water Filtration

(*Continued from page 52*)

About this time another type of supplementary surface wash entered the filtration field and made it possible to wash filters effectively at much lower rates of rise. This was a simple, water driven rotating arm equipped with high velocity nozzles. It required only about one-half gallon of water per minute per square foot, at water pressures usually available in the filter plant.

Washing Filters Better

This surface wash equipment, developed by Palmer at Erie, Pa., created such an increase in agitation in the expanded filter bed that rates of backwash could be safely reduced to 12 to 15 inches rise. Plants which installed this equipment found that they could realize additional savings in wash water without any danger of losing the lighter Anthrafilt medium; and that much longer filter runs could be obtained from the thoroughly clean fiiter beds. Hundreds of filter beds are now operating at top efficiency with the combination of this type of rotary surface wash and Anthrafilt, without any time out for regrading, removal of mud balls or mechanical cleaning of filter medium.

In lime softening plants the degree of particle coating can be either closely controlled or entirely eliminated to suit the individual ideas of the operator. Certainly no other combination of filter components has ever made such a drastic improvement in filter operation as have these two items, Anthrafilt and rotary surface wash.

Many present users of Anthrafilt made their initial purchase of this material ten or twelve years ago; or, as in the case of the original users of anthracite coal such as Dallas, Texas, 40 years ago. In almost every case the entire plants have been completely equipped with Anthrafilt. If additions have been made to the plant, Anthrafilt has been specified as the filter medium.

Some of the outstanding installations of Anthrafilt in large filter plants, are: The Passaic Valley Water Commission at Paterson, N. J.; the Hackensack Water Co., Hackensack, N. J.; New Brunswick, N. J.; Oklahoma City, Okla.; Dallas, Texas; Kankakee, Ill.; Erie, Pa.; Plattsburgh, N. Y.; and Wheeling, W. Va. Hundreds of swimming pool filters use Anthrafilt. In the metro-

politan area of New York alone, over 200 pools use this material. Probably the largest installation in the country is at the Atomic Plant at Hanford, Wash., where the entire filter plant is equipped with Anthrafilt. At the time the original plant was built this material was chosen as the filter medium over all others tested. As the size of the plant has increased and additional filter facilities were required, Anthrafilt has repeatedly been tested along with other media and has always been called for in the final specifications.

In summing up this article we would like again to point out that in roughly a 20-year span Anthrafilt has been developed and has proved itself. It has been a means of bringing new life to old filters, and of increasing filter capacities to meet the needs of a growing population and industry, but in addition, it is contributing toward the development of new industrial processes. It will be interesting to note what future applications it may have in the field of filtration, industrial control and recovery of wastes.

Graders for South Dakota

The South Dakota State Highway Department has purchased 18 Allis-Chalmers motor graders, a part of recent equipment purchases of approximately $500,000.

Battle Creek

(*Continued from page 56*)

only lends a very pleasing appearance but provides a shaded veranda space for the use of customers. Only a nominal charge is made, the principal revenue being derived from the concessions which are operated by the Department of Buildings and Grounds and Recreation. The beach area is surrounded by a large wooded picnic ground with many outside grills on the grounds adjacent to the picnic tables. Suitable sanitary facilities are provided.

Planning for the Future

The study of Harland Bartholomew and Associates includes the future arrangement of schools and parks, and plans have been drawn and work is now progressing on additional park area. This will include five small lakes inside the boundaries of the City, and will provide tennis courts, ski runs, horseshoe courts, picnic tables and possibly swimming facilities. Park drives are being built and it is expected that the completion of this

L. COFF
Consulting Engineers
Prestressed Concrete Structures
Design Estimates, Erection Methods
Supervision
198 Broadway New York 7, N. Y.
Tel. Co. 7-2753

CHAS. W. COLE & SON
Consulting Engineers
Sewerage, Sewage Treatment, Industrial Wastes, Water Supply, Water Treatment, Airports, Industrial Buildings
Design and Supervision
Chas. W. Cole, Sr. Chas. W. Cole, Jr.
Ralph J. Bushee M. J. McErlain
Wilbur H. Gartner
220 W. LaSalle South Bend, Ind.

CONSOER, TOWNSEND & ASSOCIATES
Water Supply — Sewerage — Flood Control & Drainage — Bridges — Express Highways — Paving — Power Plants — Appraisals — Reports — Traffic Studies — Airports
351 East Ohio Street
Chicago 11, Ill.

OSCAR CORSON
Consulting Engineers
Sewerage Systems — Sewage & Industrial Waste Treatment — Water Supply — Drainage
Airfields — Roads — Railroads
Const. Surveys — Land Subdivisions
Design — Supervision — Industrial Layout
902 Highland Avenue, Ambler, Pa.

DE LEUW, CATHER & COMPANY
Consulting Engineers
Public Transit, Traffic and Parking Problems
Railroads Grade Separations
Major Thoroughfares Expressways
Subways Tunnels
Power Plants Municipal Works
150 North Wacker Drive, Chicago 6, Ill.
79 McAllister St., San Francisco 2, Calif.

A. W. DOW, Inc.
Chemical Engineers
Consulting Paving Engineers
Mem. Am. Insti. Ch. Engrs.
Asphalt, Bitumens, Tars, Waterproofing, Paving, Engineering, Materials
801 Second Avenue New York

GANNETT FLEMING CORDDRY & CARPENTER, Inc.
Engineers
Water Works, Sewage, Industrial Wastes & Garbage Disposal
Roads, Airports, Bridges & Flood Control
Town Planning, Appraisals, Investigations & Reports
Harrisburg, Pa. Pittsburgh, Pa.
Daytona Beach, Florida

GILBERT ASSOCIATES, INC.
Engineers and Consultants
Power Plant Engineering
Water Supply and Purification
Sewage and Industrial Waste Treatment
Chemical Laboratory Service
New York READING, PA. Philadelphia
Houston Washington

GREELEY & HANSEN
Engineers
Water Supply, Water Purification
Sewerage, Sewage Treatment
Flood Control, Drainage, Refuse Disposal
220 S. State Street, Chicago 4

HOWARD R. GREEN CO.
Consulting Engineers
DESIGN AND SUPERVISION OF MUNICIPAL DEVELOPMENTS
Water Works and Treatment—Sewers and Sewage Disposal—Investigations and Valuations
208-10 Bever Bldg., Cedar Rapids, Iowa
Established 1913

JOHN J. HARTE CO.
Engineers
Waterworks, Sewerage, Treatment Plants, Gas Systems, Street and Storm Drainage, Improvements, Public Buildings, Airports
ATLANTA, GEORGIA

HILL & HILL
Engineers
Sewage and Waste Disposal, Water Supply and Filtration, Dams, Reservoirs, Tunnels, Airport and Topographic Surveys
Home Office: 24 E. Main St., North East, Pa.

HITCHCOCK & ESTABROOK, INC.
LESTER D. LEE, ASSOCIATE
Consultants to Municipalities Since 1930
Water, Sewerage, Paving, Power Plants, Airports, Public Buildings, Surveys and Appraisals
248 Sheridan Road 521 Sexton Building
Menominee, Michigan Minneapolis 15, Minn.

JONES, HENRY & SCHOONMAKER
(Formerly Jones & Henry)
Consulting Sanitary Engineers
Water Works
Sewerage and Treatment
Waste Disposal
Security Bldg. Toledo 4, Ohio

ENGINEERING OFFICE OF CLYDE C. KENNEDY
Complete Engineering Service
For More Than a Quarter Century
Investigations, Reports, Design, Supervision of Construction and Operation
Water Supply, Water Conditioning, Sewerage, Sewage and Industrial Waste Treatment
CHEMICAL AND BIOLOGICAL LABORATORY
604 Mission Street San Francisco 5

MORRIS KNOWLES, INC.
Engineers
Water Supply and Purification, Sewerage and Sewage Disposal, Industrial Waste, Valuations, Laboratory, City Planning
1312 Park Building, Pittsburgh 22, Pa.

ROBERT AND COMPANY ASSOCIATES
Architects and Engineers
ATLANTA
WATER SUPPLY • SEWAGE DISPOSAL • INCINERATORS • POWER PLANTS

This directory is continued on page 78

HAROLD M. LEWIS
Consulting Engineer—City Planner
Analyses of urban problems, master plans, zoning, parking, airports, subdivisions, redevelopment. Reports—plans—ordinances
15 Park Row — New York 7, N. Y.

WM. S. LOZIER CO.
Consulting Engineers
Sewerage, Sewage Disposal, Water Supply, Water Purification, Refuse Disposal
10 Gibbs Street — Rochester 4, N. Y.

METCALF & EDDY
Engineers
Water, Sewage, Drainage, Refuse and Industrial Wastes Problems
Airfields — Valuations
Laboratory
Statler Building, Boston 16 — 111 Sutter St., San Francisco 4

PALMER AND BAKER, INC.
Consulting Engineers
For Problems of Transportation
Subaqueous Vehicular Tunnels
Rock Tunnels, Utility Tunnels, Bridges, Grade Separations, Highways, Airports, Traffic Studies, Parking Problems
Waterfront and Harbor Structures
Mobile, Alabama

BOYD E. PHELPS, INC.
Architects-Engineers
Water Supply and Purification
Sewage & Industrial Waste Treatment
Municipal Buildings
Airfields, Power Plants
Reports & Investigations
Michigan City, Indiana — Indianapolis, Indiana

MALCOLM PIRNIE ENGINEERS
Civil & Sanitary Engineers
Malcolm Pirnie — Ernest W. Whitlock
Richard Hazen — C. G. Werner, Jr.
Investigations, Reports, Plans
Supervision of Construction and Operations
Appraisals and Rates
25 W. 43rd St. — New York 18, N. Y.

THE PITOMETER COMPANY
Engineers
Water Waste Surveys
Trunk Main Surveys
Water Distribution Studies
Water Measurements and Tests
Water Wheels, Pumps, Meters
New York — 50 Church St.

RUSSELL & AXON
Consulting Engineers
Geo. S. Russell — F. E. Wenger
Joe Williamson, Jr.
Water Works, Sewerage, Sewage Disposal, Power Plants, Appraisals
408 Olive St., St. Louis 2, Mo. — Municipal Airport, Daytona Beach, Fla.

SMITH & GILLESPIE
Municipal and Consulting Engineers
Water Supply, Water Purification, Sewerage, Sewage Disposal, Drainage
Refuse Disposal, Gas Systems, Power Plants
Airports
Jacksonville — Florida

STANLEY ENGINEERING COMPANY
Consulting Engineers
Airports—Drainage
Electric Power—Waterworks
Sewerage—Valuations—Rate Studies
Municipal Buildings
Hershey Building — Muscatine, Ia.

ALDEN E. STILSON & ASSOCIATES
Limited
Consulting Engineers
Water Supply, Sewerage, Waste Disposal, Mechanical, Structural
Surveys, Reports, Appraisals
209 So. High St. — Columbus, Ohio

EMERSON D. WERTZ AND ASSOCIATES
Municipal Engineers
Waterworks, Drainage, Refuse Disposal, Sewerage, Streets, Industrial Wastes
116½ East High Street, Bryan, Ohio

CONSULTING ENGINEERS
For rates for this space write:
PUBLIC WORKS MAGAZINE
310 East 45th St. — N. Y. 17

project will provide many people with recreational facilities at a very nominal cost. This work is currently all being performed by the Department of Public Works.

During 1948 the many recreational facilities provided by the city were enjoyed by the following number of participants:

Indoor Recreation	154,301
Playground and Athletic Fields	65,257
Beaches	82,150
Swimming Pools	56,583
Skating Rinks	31,500
Special Events and Service	84,150
	473,941

During 1949 the participation was as follows:

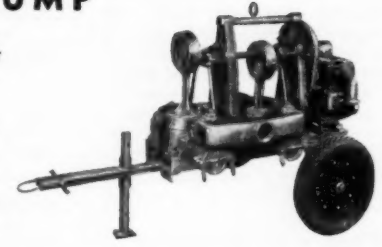
Indoor Recreation	250,160
Playground and Athletic Fields	208,774
Beaches	134,362
Swimming Pools	35,563
Skating Rinks	8,666
Special Events and Service	125,152
	762,677

In early issues, two articles will cover Flood Control as developed by the Department of Public Works with the cooperation of U. S. Army Engineers; and also the long range waterworks improvement program which will be completed in 1950.

NOVO QUALITY EQUIPMENT FOR FIFTY-NINE YEARS

A NEW PUMP
- DOUBLE DIAPHRAGM
- DOUBLE CAPACITY
- DOUBLE DUTY

Handles twice the amount of muddy, or sand and debris-laden water as does Novo's well-known single diaphragm model. Write or wire for specifications on this new pump



WRITE FOR NEW BULLETINS ON THE NOVO TO FIT YOUR NEEDS

NOVO ENGINE COMPANY, LANSING, MICH.

When you need special information—consult READERS' SERVICE DEPT. on pages 85-89.

PUBLIC WORKS Equipment News

Lift Loader Increases Maintainer Efficiency

A new lift loader attachment is available for the Huber maintainer. This mounts directly on the maintainer frame and can lift a half-ton load 9 ft. 8 ins. high for dumping. A ⅜-yd. bucket is furnished for handling sand, stone and dirt; and a larger bucket for snow removal. It can also be used with a sod fork for recovering gravel; and can be supplied with attachments so it can be

Maintainer with lift loader.

used as a grader, berm leveler, road planer, bulldozer, snow plow, highway mower, one-way broom and patching roller. Information from Huber Mfg. Co., Marion, O., or by using the coupon.

Use coupon on page 85; circle No. 5-1.

Aluminum Manhole Steps

Forged aluminum manhole steps are adaptable to brick or concrete manhole construction. They are made of 61S-T6 alloy, of high corrosion resistance and ample strength. Also, they are non-sparking. Three sizes are available, all, of course, non-corrosive. Data from Aluminum Co. of America, 801 Gulf Bldg., Pittsburgh 19, Pa., or use the coupon.

Use coupon on page 85; circle No. 5-2.

Better Street Lighting

What one small but progressive city did to improve its street lighting is shown in the night view of Lawrenceburg, Tenn., herewith. Use of these new lighting standards with continuous tapered 25-ft. octagon shafts, and 6-ft. detachable

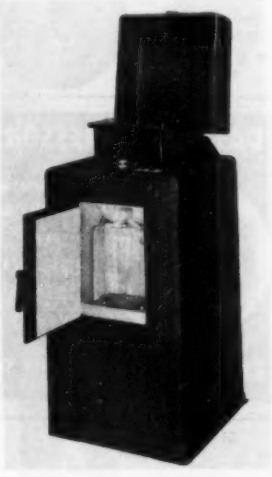
Getting better street lighting.

brackets, provides brilliant illumination at walking and driving levels. The standards shown were designed and engineered by Kerrigan Iron Works, Inc., Nashville, Tenn. Full data from them or by using the coupon.

Use coupon on page 85; circle No. 5-3.

Getting Representative Sewage Samples

Raw sewage or sewage at any stage of treatment is truly sampled with this equipment. A curved overflow on the sampler ladle assures the collection of the correct volume in every case. Samples may be collected at any desired interval from 1 to 15 times per hour. The sampler



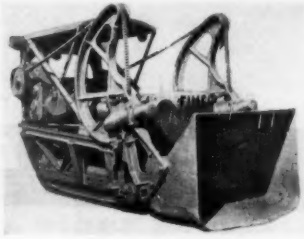
For better sewage sampling.

case is designed to include a refrigeration unit with automatic temperature controls, if such is desired. A bulletin describes this unit fully. Data from Infilco, Inc., 325 W. 25th Place, Chicago 16, Ill., or by using the coupon.

Use coupon on page 85; circle No. 5-4.

Crawler Mounted Shovel

A crawler tractor mounted shovel, this new unit has loaded wet sand at the rate of 8 yards a minute. It



Crawler mounted shovel.

is particularly designed for digging and loading blocky rock and other hard-to-handle materials, and it also can be used for bulldozing. The straight backward and forward motion eliminates the necessity for turning to dump. The bucket is 2-yd.; and the crawler has 48 diesel hp. Complete bulletin on request. Write Eimco Corp., Salt Lake City 8, Utah, or use the coupon.

Use coupon on page 85; circle No. 5-5.

Power Post Hole Digger

A self-contained, self-powered portable post hole digger weighs less than 100 pounds and will dig to a depth of 36 ins. The auger is 9 ins. diameter and is powered by a 1½-hp engine. Full data from Lodge & Shipley, Inc., 8th & Elm Sts., Cincinnati, O., or by using the coupon.

Use coupon on page 85; circle No. 5-6.

For Drill Cores to 600-Ft. Depth

This light and compact drill will give cores to 600 ft. in depth. It has 3 speeds, and either hydraulic or screw feed. Power can be supplied from any type of power plant. Drill travel is 24 ins., and long drill rods permit infrequent changes. The gate-

GET THOSE WEED ROOTS!

GO TO THE ROOT OF YOUR WEED PROBLEM WITH THESE DOLGE PRODUCTS

DOLGE SS WEED-KILLER

Where no vegetation whatever is desired. Penetrates deep down to plant roots and *kills.* Sterilizes the soil, preventing normal sprouting of wind-blown seeds. Weeding the thorough, modern *chemical* way eliminates backbreaking toil and saves the cost of many labor-hours.

E.W.T. *SELECTIVE* WEED-KILLER 2-4-D

Highly recommended for maintaining beauty of lawn and fairway. Works its way down into the roots of brush, dandelion, plantain, poison ivy, ragweed, sumac and other obnoxious plants, *but does not injure most turf grasses.*

Please write for descriptive literature explaining how these tested DOLGE products can best be used for *your* weeding requirements.

The C. B. DOLGE Co.
WESTPORT, CONNECTICUT

"GUNITE"

FOR REPAIR OF

DAMS

Regardless of state of disintegration, dams can be repaired economically with a resurfacing of reinforced "Gunite."

● *YEARS OF ADDED SERVICE*

● *LOW MAINTENANCE*

Write for our 48-page Illustrated Booklet on "Gunite." It's Free

PRESSURE CONCRETE COMPANY
"Gunite" Contractors and Engineers
193 EMMET ST., NEWARK 3, N. J.
SO. COURT ST., FLORENCE, ALA.
33 NO. LA SALLE ST., CHICAGO, ILL.
LIBERTY LIFE BLDG., CHARLOTTE, N. CAR.

MAGNETIC DIPPING NEEDLE $17.50

with 3 section telescoping handle $22.25

Write Today for 68-Page Catalog

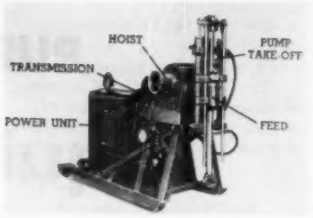
W. S. DARLEY & CO.
Chicago 12

DAVEY COMPRESSORS

ONLY COMPRESSOR WITH PERMANENT PEAK EFFICIENCY LIFETIME VALVES

DAVEY COMPRESSOR CO.
KENT, OHIO

Give to Conquer Cancer
AMERICAN CANCER SOCIETY



For subsurface exploration.

head is hinged to swing clear of the hole, so that it is unnecessary to move the unit when a string of rods is being lowered or hoisted. Holes can be drilled vertically, horizontally or at any desired angle. A power takeoff is provided for driving an integrally mounted pump. Ask for Bulletin 30 from Acker Drill Co., Inc., Scranton 3, Pa., or use the coupon.

Use coupon on page 85; circle No. 5-7.

To Mow "Hard-to-Get-At Places"

This light-weight (24 lbs.) power mower can be used for roadside mowing too rough for machine work;

Speeds up mowing work.

to give the golfers a break in some of that senior rough; and for mowing around guard rails, posts, etc. A gasoline engine (1¾-hp) furnishes the power. It quadruples the efficiency of manpower. It will also do two other important jobs. It will cut underwater growths, and it will trim hedges. Full information from Hoffco, Inc., 411 No. 8th St., Richmond, Ind., or by using the coupon.

Use coupon on page 85; circle No. 5-8.

Well-Designed Water Sprinklers

Water sprinkler tanks for soil stabilization, dust-laying, weed control and water hauling are available skid-mounted, truck-mounted, or 4-wheel trailer mounted, in capacities from 800 to 1,500 gals. The

a "10-TON ROLLER" that weighs only 240 lbs ....

Super-tamps, finishes, cures 45 to 60 sq. ft. per minute of bituminous or dry concrete pavement patching, mastic or cement composition floor base, or earth. Works flush to walls, curbs, tracks, manholes.

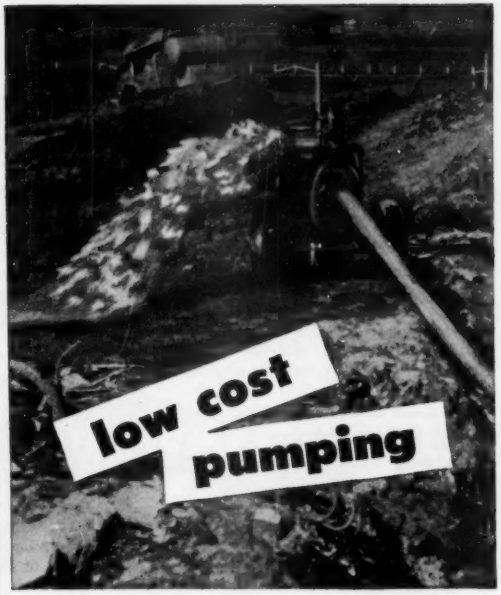
Striking 1900 blows per minute, each of more than 1250 ft. lbs. impact, the Wayer Impactor produces density greater than a 10-ton roller and in places a roller can't reach. Heated plate cures surface, ready for immediate traffic. Transports on material truck. One man operates. Big cost-savings.

Can work flush to any edge

Send for Bulletin 25-9 and name of distributor.

WAYER IMPACTOR

Wayer Impactor, Incorporated, 12 N. Third St., Columbus 15, Ohio



JAEGER invites 5-way comparison with any other pumps

1 - Actual priming speed
2 - Vacuum, capacity and pressure
3 - Gallons of water moved per gallon of fuel
4 - Self-cleaning ability
5 - Hours of service per dollar invested

1½" and 2" Aluminum Pumps: 5100 and 9000 gph. Replaceable liners, stainless steel shell fittings.

Heavy Duty 2", 3", and 4" Portables: Also lighter utility models.

Slow-Speed, Long-Life 6", 8", 10" Pumps —Full capacity at 1450 rpm instead of usual 1800, for all dewatering service.

2" to 8" Pressure Pumps for jetting and supply pumping at higher heads.

See your Jaeger distributor or send for complete Catalog P-10.

THE JAEGER MACHINE CO., Columbus 16, Ohio

Leading distributors in 130 cities of the United States and Canada sell, rent and service Jaeger-engineered equipment

COMPRESSORS • PUMPS • MIXERS • HOISTS
BITUMINOUS and CONCRETE PAVING MACHINES

One Man Gang

GOLDAK model 87

Featherweight

PIPE LOCATOR

Only the Goldak Model 87 offers these BIG features:

PENTODE TUBES: These tubes have biased voltage which makes possible sharply defined separation of closely spaced pipes.

MICROTUNING: The metal handle is quickly and rigidly locked for perfect electronic balancing.

APPROVED LICENSE: The Goldak Company manufactures the only Pipe Locator licensed by Western Electric, added assurance of better performance.

• EXACT location of buried pipes, mains, gates, tees, etc • Total weight, 11 lbs.—one man operation! • Strong, positive location signal. • Standard miniature radio tubes and flashlight batteries. • Lasts a lifetime — guaranteed performance.

Write for FREE literature.

The GOLDAK Company

1545 W. GLENOAKS BLVD., GLENDALE 1, CALIF.

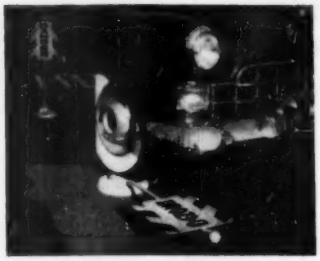
Littleford sprinkler.

large manhole makes them easy to fill; spray bars are easy to remove and can be made with shifting and end-folding features. Full data from Littleford Bros., Inc., 453 East Pearl St., Cincinnati 2, O., or by using the coupon.

Use coupon on page 85; circle No. 5-9.

A Folding Road Traffic Marker

An all-metal flexible road traffic marker and highway sign has many advantages. It can be folded flat for storage in warehouses or handling in trucks, permitting more signs to be carried. The warning disc can be set to face any direction. The weighted base prevents tipping or blowing over. Signs can be picked up from a moving truck. One man can carry six of them. If hit by a car, the sign folds down, reducing damage. Small sign for road work is 28" high; larger sign for traffic



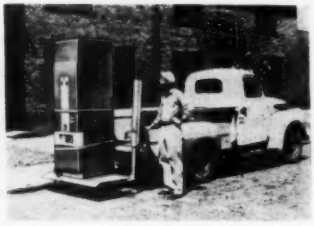
New type traffic marker.

control is 48" high. Full data from American Coach & Body Co., Cleveland, Ohio, or by using the coupon.

Use coupon on page 85; circle No. 5-10.

Rear Lift Gate for Light Trucks

A "freight elevator" or pick-up lift gate for ½-ton and ¾-ton trucks is now available. It will handle weights up to 800 pounds and will stop and hold at any level. This should be most helpful in many county and municipal jobs where tools, supplies and equipment have hitherto been manhandled into the truck. In addition to saving on



Loading trucks without strain.

labor, it makes it easier for the men. It is also available in larger sizes for larger trucks. Full data from Anthony Co., Streator, Ill., or by using the coupon.

Use coupon on page 85; circle No. 5-11.

Sanitizer and Deodorant

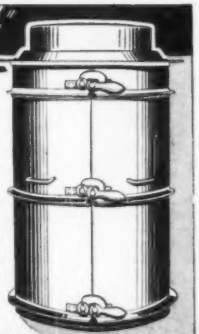
A new product—a sweet smelling liquid—has been developed which is said to act as both a bactericide and an insecticide, and to have promise in application to streams which are polluted with sewage or other organic wastes. Called Polycide, the liquid is non-toxic and non-inflammable, and is readily emulsified in water. Information from Brooks Boiler Treatment Co., Cleveland 4. Ohio.

Use coupon on page 85; circle No. 5-12.

FRINK SNO-PLOWS
TRADE MARK
FRINK SNO-PLOWS, INC.
CLAYTON 1000 Islands NEW YORK
DAVENPORT-BESLER CORP. DAVENPORT, IOWA
FRINK SNO-PLOWS OF CAN. LTD. TORONTO, ONT.

M-SCOPE
PIPE — LOCATOR
Light Weight Model AB
Only $149.50
Metal Cased Cabinets
Superior Performance
at *Lower Cost*
Pipe Finder — Leak Detector
Combination Type BL $197.50
Free Illustrated Lit.
FISHER RESEARCH LAB., INC.
PALO ALTO CALIF.

THE "Quinn Standard"
FOR CONCRETE PIPE



The Quinn Standard is known as the best the world over, wherever concrete pipe is produced and used. Backed by over 35 years service in the hands of hundreds of Quinn-educated contractors, municipal departments and pipe manufacturers who know from experience that Quinn pipe forms and Quinn mixing formulas combine to produce the finest concrete pipe at lowest cost.

QUINN HEAVY DUTY PIPE FORMS

For making pipe by hand methods by either the wet or semi-dry processes. Built to give more years of service—sizes for pipe from 10" up to 120" and larger—tongue and groove or bell and pipe at lowest cost.

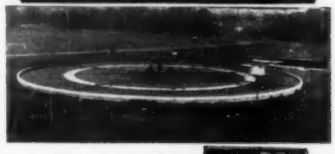
WRITE TODAY. Complete information, prices, and estimates sent on request.
Also manufacturers QUINN CONCRETE PIPE MACHINES

QUINN WIRE & IRON WORKS 1621 12TH ST. BOONE, IA

FOR MAXIMUM UTILIZATION OF THE FILTERING AREA

P.F.T. Rotary Distributors provide a practical, efficient unit for dosing sewage to filter medium, in minimum area and with minimum piping. Operate at minimum head, frequently eliminating piping. Features include patented spreader jets that assure full, even coverage of the filter bed; triple valves and a positive mercury seal. Ask for Bulletin No. 213.

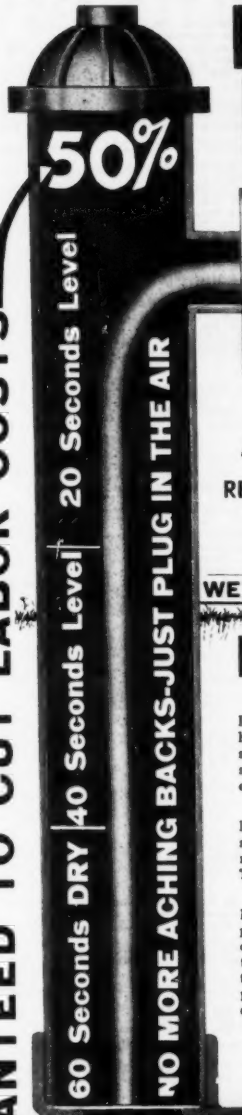
P.F.T. ROTARY DISTRIBUTORS



P.F.T. PACIFIC FLUSH TANK CO.
4241 RAVENSWOOD AVE., CHICAGO
NEW YORK • CHARLOTTE, N. C.
SAN FRANCISCO • LOS ANGELES
DENVER • TORONTO

When you need special information—consult READERS' SERVICE DEPT. *on pages 85-89.*

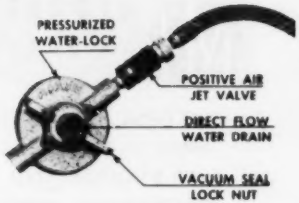
FROZEN HYDRANTS ARE DANGEROUS



Adams "ONE-MINUTE" Hydrant *Jet* DRAIN

Will drain any standard FIRE PLUG absolutely dry in SIXTY SECONDS.

Pat. App. For



GUARANTEED TO CUT LABOR COSTS

SAFETY + ECONOMY = SAVINGS!

COMPLETE AS SHOWN READY TO USE

FOR ONLY $49.50 EACH

WE HAVE SMALL COMPACT, PORTABLE AIR UNITS IF NEEDED!

ITS NEW! IT'S HERE! IT'S NEEDED!

IT'S NEW! Engineers proclaim this the most time shattering development of the century. Age old hydrant pumping methods have become obsolete overnight. A laborous back breaking, time consuming, hydrant operation has been made a simple, easy, pleasant routine check-up task. The simplicity of principal and operation of the new JET DRAIN is amazing, but the safety and economy in labor reduction costs is as concrete as the hydrants themselves.

IT'S HERE! Summer has arrived and so has the new JET DRAIN. One seldom thinks of snow shoes in June, but it's a universal practice among all leading retailers to order their Christmas merchandise in April. WISE BUYERS, BUY EARLY for the seasonal rush! Place your order TODAY for early FALL DELIVERY only 90 DAYS AWAY!

IT'S NEEDED! The new ALL BRONZE, NON-CORROSIVE, LIFE LASTING JET DRAIN IS A "MUST" piece of equipment for all Hydrant Maintenance Departments. Fits any size hydrant and is operated by compressed air. A drain off hose is inserted in water port of hydrant and extended to bottom of hydrant barrel. Pressurized water lock is then placed into position as shown and tightened by normal hand grip to water port. Lock nut then seals hydrant barrel ready for air pressure. Simply plug in air jet valve and water is expelled from hydrant in 60 seconds. The complete JET DRAIN weighs approximately four pounds and is portable from hydrant to hydrant.

EACH JET DRAIN PURCHASED WILL BE DEMONSTRATED IF DESIRED.

ORDER TO-DAY! FOR IMMEDIATE DELIVERY

Jet DRAIN ENGINEERING CO.

215 N. FAYETTE STREET SAGINAW, MICHIGAN

YOUR WATER MAIN IS --- OUR MAIN CONCERN

When writing, we will appreciate your mentioning PUBLIC WORKS

"PIPE-LINE TRAFFIC COPS"

M H HYDRANTS and VALVES

HUB ENDS . . . FLANGED ENDS . . . UNIVERSAL OR STANDARDIZED MECHANICAL JOINT

Water & Sewerage Works Materials, Catalog 34.

Fire Protection Materials, Catalog 40

VALVES — A.W.W.A. approved, iron body, bronze mounted with double disc parallel seat or solid wedge. Non-rising stem, outside screw and yoke . . . . spur or bevelled gear . . . hydraulic or motor operated . . . square bottom and low pressure. Also approved Underwriters and A.F.M. series. Shown above is an M & M 30-inch I.B.B.M. Gate Valve with bevel gears, extended grease case and 4-inch by-pass.

M & H PRODUCTS INCLUDE

FIRE HYDRANTS
GATE VALVES
WALL CASTINGS
SPECIAL CASTINGS
TAPPING SLEEVE AND VALVES
CHECK VALVES
FLOOR STANDS
SPRING LEVER CHECK VALVES
EXTENSION STEMS
ELECTRIC MOTOR OPERATED VALVES
SHEAR GATES
MUD VALVES
FLAP VALVES
SLUDGE SHOES
FLANGE AND FLARE FITTINGS
FLANGED FITTINGS
L & S FITTINGS
CUTTING-IN TEES
HYDRAULIC OPERATED VALVES

M & H VALVE AND FITTINGS COMPANY
ANNISTON, ALABAMA

INDEX OF ADVERTISEMENTS

Acker Drill Co.	90
Albright & Friel, Inc.	76
Allis Chalmers Tractor Div.	11
All Purpose Spreader Co.	68
Alvord, Burdick & Howson	76
Anthracite Equipment Corp.	84
Ayer-McCarel-Reagan Clay Co.	73
Baker, Jr., Michael	76
Bannister Engineering Co.	76
Barker & Wheeler	76
Black & Veatch	76
Blaw Knox Div.	58
Bogart Assoc., Clinton L.	76
Bowe, Albertson Assoc.	76
Bowerston Shale Co.	73
Brown Engineering Co.	75
Buck, Seifert & Jost	76
Buffalo-Springfield Roller Co.	67
Builders Providence	62
Burgess & Nipple	76
Burns & McDonnell Eng. Co.	76
Caird, James M.	76
Capital Engineering Corp.	76
Carter Co., Ralph B.	86
Caterpillar Tractor Co.	15
Central Foundry Co.	74
Centriline Corp.	89
Chemical Insecticide Co.	69
Chester Engineers	76
Chicago Bridge & Iron Co.	32
Chicago Pump Co.	3
Coff, L.	77
Cole & Son, Chas. W.	77
Consoer, Townsend & Assoc.	77
Continental Steel Corp.	87
Corson, Oscar	77
Darley & Co., W. S.	80
Davey Compressor Co.	80
DeLeuw, Cather & Co.	77
Dempster Brothers, Inc.	57
Dickey Clay Mfg. Co., W. S.	73
Dodge Co., The C. B.	80
Dorr Co.	19
Dow, A. W., Inc.	77
Dresser Mfg. Div.	63
Fisher Research Lab, Inc.	82
Flexible Sewer-Rod Equipment Co.	72
Foote Co., Inc.	66
Ford Meter Box Co.	64
Ford Motor Co.	91
Frink Sno-Plows, Inc.	82
Galion Iron Works & Mfg. Co.	2
Gannett, Fleming, Corddry & Carpenter, Inc.	77
Gar Wood Industries	14
General American Transportation Corp.	75
Gilbert Associates, Inc.	77
Globe Phone Mfg. Corp.	88
Goldak Co.	81
Gorman Rupp Co.	70
Greeley & Hansen	77
Green Co., Howard R.	77
Harte Co., John J.	77
Hauck Mfg. Co.	58
Hellige, Inc.	56
Heltzel Steel Form & Iron Co.	17
Hill & Hill	77
Hitchcock & Estabrook	77
Homalite Corp.	26
Hydraulic Development Corp.	12
Hydrauger Corp., Ltd.	86
Infilco, Inc.	61
International Harvester Co.	29
Irving Subway Grating Co.	69
Jaeger Machine Co.	81
Jet Drain Engineering Co.	83
Johns Manville Corp.	30 & 31
Jones, Henry & Schoonmaker	77
Josam Mfg. Co.	58
Kennedy, Clyde C.	77
Knowles, Inc., Morris	77
Layne & Bowler, Inc.	25
Leak Detector Co.	87
Lewis, Harold M.	78
Link-Belt Co.	23
Littleford Bros., Inc.	70
Lock Joint Pipe Co.	13
Lozier & Co., Wm. S.	78
McCulloch Motors Corp.	7
McDonald Mfg. Co., A. Y.	8
McWane Cast Iron Pipe Co.	74
Metcalf & Eddy	78
Motorola, Inc.	9
M & H Valve & Fittings Co.	84
Murdock Mfg. & Supply Co.	90
National Clay Pipe Mfrs., Inc.	16
National Fireproofing Corp.	73
Nichols Engrg. & Research Corp.	28
Nove Engine Co.	78
Pacific Flush Tank Co.	82
Palmer Filter Equip. Co.	70 & 84
Palmer & Baker, Inc.	78
Permutit Co.	27
Phelps Dodge Refining Corp.	56
Phelps Inc., Boyd E.	78
Pirnie Engineers, Malcolm	78
Pitometer Company	78
Pomona Terra-Cotta Co.	73
Pressure Concrete Co.	80
Proportioneers, Inc.	Front Cover
Quinn Wire & Iron Works	82
Raytheon Mfg. Co.	21
Robert & Co.	77
Roberts Filter Mfg. Co.	24
Roots Connersville Blower Corp.	18
Russell & Axon, Cons. Engrs.	78
Simplex Valve & Meter Co.	20
Skinner Co., M. B.	88
Smith & Gillespie	78
Standard Steel Works	66
Stanley Engineering Co.	78
Stilson Assoc., Alden E.	78
Superior Engine Division	10
Tennessee Corp.	28
Texas Vitrified Pipe Co.	73
Trickling Filter Floor Institute	73
Wallace & Tiernan Co., Inc.	Back Cover
Wayer Impactor, Inc.	81
Wertz & Assoc., Emerson D.	78
Wolverine Tube Division	4
Wood Co., R. D.	60
Worthington Pump & Machinery Corp.	22

GIVE TO THE RED CROSS

ANTHRAFILT

Trade Mark Reg. U. S. Pat. Off.

As a Modern Filter Medium Has Outstanding Advantages Over Sand & Quartz Media

1. Length of Filter runs doubled
2. Only about one half as much wash water required
3. Less coating, caking or balling with mud, lime, iron or manganese
4. Filters out of service less because of shorter wash cycle
5. Better removal of bacteria, micro-organic matter, taste and odor
6. Increased Filter output with better quality effluent
7. Not just the top portion, but the entire bed aids in filtering
8. Can be used in all types of Filters using a filter media
9. A perfect supporting media for synthetic resins
10. An ideal Filter media for industrial acid & alkaline solutions
11. Decidedly advantageous for removal of fibrous material as found in swimming pool filters

Additional information, recommendations and quotations furnished upon request by

PALMER FILTER EQUIPMENT COMPANY
822 East 8th Street, P. O. Box 1655 Erie, Pennsylvania

Representing

ANTHRACITE EQUIPMENT CORPORATION
Anthracite Institute Building, Wilkes-Barre, Pennsylvania

✓ CHECK THESE FREE CATALOGS NOW!

Mail Coupon to Order Those You Need

These helpful booklets are free. Just circle numbers you want on coupon and mail or write the manufacturer direct and mention PUBLIC WORKS. This service is restricted to those actually employed in public work.

NEW LISTINGS

Radiophone Equipment for Two-Way Communications

68. Increased efficiency is available to all departments through the use of two-way Radiophone equipment. Full description of compact 30-watt mobile model, 30- and 60-watt base station equipment will be sent promptly. Write Raytheon Mfg. Co., Dept. 6460PW, Waltham 54, Mass.

Book Tells How to Control Algae

92. Details on the control of various microscopic organisms frequently found in water supplies, and the elimination of tastes and odors are discussed in "The Use of Copper Sulphate in Control of Microscopic Organisms." For your free copy write Phelps Dodge Refining Corp., Dept. PW, 40 Wall St., New York 5, N. Y.

Folders Tell "Inside" Story Of Crawler Tractors

108. Performance-boosting and cost-cutting features of International crawler tractors are graphically presented in two new folders issued by International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill. Titles are "How Long is Your Tractor's Life Line" and "Is Your Horsepower Getting to the Track?".

Efficient Material Handling to Reduce Incineration Costs

130. Blaw-Knox Buckets specially designed for refuse and garbage handling are described in 22-page Bulletin 2247. Illustrations show progress of material through a modern municipal incinerator plant. Dimensions and incinerator bucket specifications are included. Blaw-Knox Div., 2124 Farmers Bank Bldg., Pittsburgh 22, Pa.

How Accurate Boring Speeds Underground Pipe Installations

135. Interesting charts showing earth boring costs, speed and accuracy for holes from 2½" to 14½" diameter and up to 80 feet long are included in 16-page Catalog No. 8 issued by Hydrauger Corp., 681 Market St., San Francisco 5, Calif. Specifications and general operating instructions are also covered.

Road Widening With Concrete, Bituminous Mix or Gravel

149. All types of road building materials are handled quickly and accurately by Apsco Wideners. New illustrated bulletin shows operations on all types of widening strips, gives details on wideners and trench rollers. Issued by All Purpose Spreader Co., Elyria, Ohio.

52-Page Reference Manual on Pioneer Conveyoflo Conveyors

202. This new handbook will help solve your conveyor problems by step-by-step plans that determine belt width, length and horsepower requirements. Then you can specify and order the conveyor you need, either pre-engineered or job-engineered types. For your free copy, write Pioneer Engineering Works, Dept. PW, Minneapolis 13, Minn.

Check This Rapid, Economical, Water Clarification and Softening

203. A new bulletin on Water Clarifiers and Cold Process Softeners describes the design, operation and features of the Graver Reactivator, with explanations in tabular form for greater clarity. Principles and chemistry of cold process water treatment are concisely explained. Get Bulletin WC-103 from Graver Water Conditioning Co., Dept. PW, 216 West 14th St., New York 11, N. Y.

Versatile Wheeled Tractor Handles Countless Jobs

204. A new booklet on industrial wheeled tractors recently published by The Oliver Corp. covers the complete Oliver line. Many application photos show use of tractors with matched allied equipment such as bucket loaders, maintainers, plows, mowers, brooms, etc. Get this bulletin, Form A-918, from The Oliver Corp., 19300 Euclid Ave., Cleveland 17, Ohio.

Self-Priming Trash Pumps Work "High and Dry"

205. The maintenance difficulties of submerged trash pumps is avoided in the new non-clogging, self-priming trash type sump pumps described and illustrated in Form 9-ST-11, issued by The Gorman-Rupp Co., Mansfield, Ohio. Performance curves and specifications are included.

Easy Way to Locate Leaks In Underground Pipe

160. Fast and accurate leak detection pays dividends in water savings and avoidance of needless digging. For data on the "Universal" Leak Locator write Leak Detector Co., 625 Hanna Bldg., Cleveland 15, Ohio.

Do You Use Efficient Chemical Dosages?

167. Variations in water impurities mean corresponding changes in the most economical and efficient chemical dosages. For convenient determinations of the best dosage rate investigate the Tyus Coagulator. Full data from the Tyus Coagulator Co., 704 S. 7th Ave., Teague, Texas.

Fabrication with Everdur For Long-Range Economy

169. Corrosion-resistant Everdur alloys are available in all wrought commercial shapes suited for dozens of applications in water and sewage plants. Many examples shown in Publication E-11 issued by The American Brass Co., Waterbury 20, Conn.

What Do You Look For In A Tractor?

177. A new 29-page illustrated booklet features the Caterpillar D8 Diesel Tractor's ability to get things done effectively, efficiently and with minimum maintenance and repair. Informative discussions and illustrations cover all features of this track-type tractor. Ask for Form 12676. Caterpillar Tractor Co., Dept. PW, Peoria 8, Ill.

Drain Any Standard Fire Plug Absolutely Dry in 60 Seconds

201. Here's a useful, new device its makers say will end backbreaking labor of draining frozen hydrants. Guaranteed to cut labor costs 50%. Simple and easy to operate. Just plug in air. Safe, economical, does job in 60 seconds. All bronze, non-corrosive. Get full details today from Jet Drain Engineering Co., Dept. PW5, 215 N. Fayette St., Saginaw, Mich.

How to Reduce Cost of Garbage Collection

206. Lower costs for trucks, bodies, operation and maintenance are featured by the Pax-All packer type year-round rubbish collector. Use coupon to get full details from St. Paul Div., Gar Wood Industries, Inc., 2207 University Ave., SE, Minneapolis 14, Minn.

REFUSE COLLECTION AND DISPOSAL

New Unit Cleans Catch Basins in a Jiffy

34. Simple powerful pneumatic bucket is featured by Netco Catch Basin Cleaner. Folder 33A gives details and illustrates operation of complete self powered truck mounted unit. Netco Div., Clark-Wilcox Co., 118 Western Ave., Boston 34, Mass.

How You Can Improve Your City's Street Cleaning

162. The Austin-Western Model 4[illegible] sweeper features three wheel design, front wheel steer, for easy maneuvering; rear broom to sweep dirt and refuse directly into 2-yd. hopper; built-in flushing device. Diagrams showing all operations and full specifications in Bulletin AD-2042, issued by Austin-Western Co., Aurora, Ill.

CLIP AND MAIL TODAY

READERS' SERVICE DEPT.
PUBLIC WORKS MAGAZINE
310 East 45th Street, New York 17, N. Y.

Please send me the following literature listed in the Readers' Service Dept. of your May issue. (Circle catalogs you need.)

Booklets from Pages 85-89:

22	23	24	26	27	33	34	36	40	42	45	46	48
50	52	53	54	58	59	60	61	63	64	65	66	68
73	76	77	80	84	87	92	93	95	97	102	106	108
109	110	111	114	119	122	129	130	131	132	133	134	135
137	142	143	145	147	148	149	150	151	154	157	159	160
161	162	165	166	167	169	175	176	177	180	182	184	186
188	192	197	198	199	201	202	203	204	205	206		

New Products, Pages 79-83:

5-1	5-2	5-3	5-4	5-5	5-6	5-7	5-8	5-9	5-10	5-11	5-12

Name .....

Occupation .....

Street .....

City ..... **State** .....

THIS COUPON NOT GOOD AFTER JUNE 30th

Chemicals for All Pest Control Work

199. Full data on dosages and methods of application of DDT, 2,4-D, BHC and other insect, weed and rodent control chemicals is available from Chemical Insecticide Co., 285 Van Brunt St., Brooklyn 31, N. Y.

STREETS AND HIGHWAYS

Shovel or Load With The Dempster Diggster

45. Automotive Hydra-Shovel digs 15 ft. above, 15 in. below grade, features independent hydraulic hoist and crowd action. Capacities 1 cu. yd. for digging solid earth, 1¼, 1½ and 2 cu. yd. for loading all types material. Get information from Dempster Brothers, Inc., 949 Dempster Bldg., Knoxville 17, Tenn.

Latest Maintenance Equipment for Blacktop Roads

52. "Blacktop Road Maintenance and Construction Equipment"—Asphalt and tar kettles, flue type kettles, spray attachments, tool heaters, surface heaters, road brooms and rollers. This is modern and up-to-date equipment for blacktop airport and road construction and maintenance. Write for Catalog R. Littleford Bros., Inc., 452 East Pearl St., Cincinnati 2, Ohio.

Improved Special Rollers Help Cities and Counties

84. Road and street widening are speeded up with Buffalo-Springfield trench rollers of improved design. Many other special compacting problems handled by the portable KT-6 model. Get engineering specifications in bulletins TR-3B and KT-6 from Buffalo-Springfield Roller Co., Springfield, Ohio.

Helpful Data on Distributors For Bituminous Materials

198. Two models of pressure distributors featuring uniform pressure and temperature, accurate displacement pumping are covered in Bulletins RS6145 and RS12046, available from Standard Steel Works, Dept. PW, North Kansas City, Mo.

Reference Manual on Guardrail Design

114. Here is an interesting and informative booklet in which all factors influencing guardrail design are outlined, and safety and economy discussed in detail. Eight pages are devoted to basic design data, with handy tables covering physical properties, tensile and beam strengths, deflection and other data. Write Armco Drainage and Metal Products, Inc., Dept. PW, Middletown, Ohio.

Heating, Thawing and Melting With Hauck Burner Equipment

142. A newly released 16-page bulletin covers the complete line of Hauck heating and melting equipment. Data covers units for every water, sewer and street department purpose, from "one-man" burners to large size portable kettles. A useful addition to your reference file. Get Bulletin 1068 from Hauck Mfg. Co., 117-127 Tenth St., Brooklyn 15, N. Y.

How to Save Time on Curb and Gutter Work

143. Every type of curb and gutter work is illustrated in the 12-page Heltzel catalog on steel forms for building concrete curbs, gutters and sidewalks. Time-saving setups show how to speed up the job and save money. Get your copy from Heltzel Steel Form & Iron Co., Dept., PW, Warren, Ohio.

Versatile Maintainer Has Year 'Round Usefulness

151. A new bulletin shows how the sturdy Huber Maintainer will work for you the year 'round on maintenance jobs, berm leveling, road planing, bull-dozing, snow plowing, brooming, mowing shoulders and as a patch roller. Good ideas on how to do all these jobs in Bulletin No. M-138. Write Huber Manufacturing Co., Dept. PW, Marion, Ohio.

Two-Way FM Radio Telephone Equipment for All Departments

197. The benefits of two-way radio communciation for all departments of municipalities and counties make full information on this subject important to all engineers. For descriptions of Motorola FM systems, or for specific recommendations concerning your application write to Dept. PW, Motorola, Inc., 4545 Augusta Blvd., Chicago 51, Ill.

SEWERAGE AND WASTE TREATMENT

How to Keep Trenching Jobs on Schedule

24. The easy maneuverability of the tough, compact Cleveland Model 95 "Baby Digger" makes it well suited for the difficult job of trenching past the many obstacles of city and suburban work. Multiple digging and crawler speeds handle all soil types and trench widths up to 24". Get Bulletin S-52 from Cleveland Trencher Co., 20100 St. Clair Ave., Cleveland 17, Ohio.

Design of Septic Tanks When Using Home Garbage Grinders

26. The use of a Youngstown Kitchens food waste disposer with a septic tank is thoroughly discussed in a new booklet released by Mullins Mfg. Corp. Tables show tank sizes for new construction, recommendations are made for improvements and better operation of existing systems, and a wealth of other valuable information is provided. For a free copy use coupon or write to Mullins Mfg. Corp., Dept. PW, Warren, Ohio.

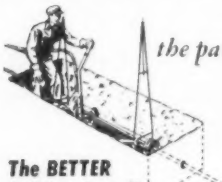
Packaged Sewage Treatment— Just Right for Small Places

36. "Packaged" Sewage Treatment Plants specifically developed for small communities—100 to 3,000 population. Write for full description and actual operating data for this type of plant. Chicago Pump Co., 2348 Wolfram St., Chicago 18, Ill.

Design Details for Sludge Collectors

42. Booklet No. P.W. 1982 on Link-Belt Circuline Collectors contains sanitary engineering data and design details. Catalog No. 1742 on Straightline Collectors, contains layout drawings, illustration pictures and capacity tables. Address Link-Belt Co., 2045 West Hunting Park Ave., Philadelphia 40, Pa.

HOW TO



keep out of the pavement breaking business!

* * * * * *

from a 2' 6" by 7' 6" trench Hydrauger BORES a straight open 200' long hole. Bore diameters — 2" through 24".

The BETTER WAY to install short runs of PIPE

FREE BULLETIN!

HYDRAUGER CORP., Ltd.
681 Market St., San Francisco 5, Calif.

Without obligation, please send me a copy of Hydrauger Bulletin which shows the low costs and high speeds of the Hydrauger.

Name_____

Address_____

Company_____ State_____

City_____

HY-21A

HYDRAUGER*

Earth Boring Tool

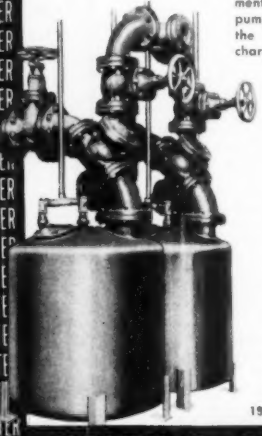
*Reg. U. S. Pat. Off.

CARTER CARTER

CARTER'S PNEUMATIC SEWAGE EJECTOR

for continuous, trouble-free, economical handling of sewage lift problems

For day-in-and-day-out 100% sewage boosting you can't afford *not* to consider Carter's pneumatic sewage ejectors. They practically pay for themselves by elimination of the costly auxiliary screening equipment required with centrifugal pumps. Solids and trash up to the size of the inlet and discharge valves are easily handled. No moving parts—no clogging or binding. Pots are either copper bearing, electrically-welded steel or cast iron—to your specifications. Hermetically sealed—completely eliminate stuffing box leaks and toxic gas dangers. Bronze mounted double disc gates and swing check valves. Rotary type air compressors of high volumetric efficiency. Fully automatic controls.



Capacities—30 to 250 GPM

Write today—give your specific waste problems, and we'll promptly furnish a detailed reply.

195 Atlantic St., Hackensack, N.J.

RALPH B. CARTER CO.

When you need special information—consult READERS' SERVICE DEPT. on pages 85-89.

A Handbook of Sewer Cleaning Equipment and Methods

46. A new, fully illustrated 40-page booklet shows every sewer cleaning operation with "Flexible" tools. Includes data on the fast and easily operated new Sewe RodeR and full engineers' specifications for power bucket machines. For your copy write Flexible Sewer Rod Equipment Co., 9059 Venice Blvd., Los Angeles 34, Calif.

How You Can Dispose Of Sewage Solids

54. Nichols Herreshoff incinerator for complete disposal of sewage solids and industrial wastes—a new booklet illustrates and explains how this Nichols incinerator works. Pictures recent installations. Write Dept. PW, Nichols Engineering and Research Corp., 70 Pine St., New York 5, N. Y.

Glazed Clay Blocks for Trickling Filter Underdrains

66. Illustrated bulletin describes the Natco Unifilter block of glazed, hard burned clay for underdraining filter beds. Write National Fireproofing Corp., 327 Fifth Ave., Pittsburgh 22, Pa., for free copy.

Recording Meters for Parabolic Flumes

73. Engineering data on parabolic flumes and accurate companion meters for open flow water and sewage metering is given in Simplex bulletin 210. Installation data and calibration included. Write Simplex Valve and Meter Co. Dept. 4, 6750 Upland St., Philadelphia 42, Pa.

Complete Catalog for Engineers Shows Sewage Plant Equipment

110. A complete, 44-page catalog gives engineering data on Jeffrey equipment for water, sewage and industrial waste treatment plants including screening, screenings grinder-grit collectors and washers, settling tank collectors, feeders, Flocktrols, mixers and other mechanical equipment. Use coupon to get Catalog 775-A, Jeffrey Mfg. Co., Columbus 16, Ohio.

How to Improve Coagulation and Sludge Conditioning

111. "Ferri-Floc," description and instructions for use in coagulation, sludge conditioning and treating industrial wastes, fully treated in a 24-page pamphlet. Tennessee Corp., 619-27 Grant Bldg., Atlanta 1, Ga.

Need Low-Cost Air For Sewage Treatment?

122. New 20-page booklet shows operating and construction features of Rotary Positive Blowers engineered to fit your needs. Air for activated sludge, water treatment; constant vacuum for filtering. Bulletin 22-23-B-13 gives details. Roots-Connersville Blower Corp., 504 Poplar Ave., Connersville, Ind.

Standard Translot Blocks For Filter Underdrains

145. Proper filter underdrainage is extremely important. Specifications and installation details for transverse slot filter underdrains made of durable vitrified clay are available from Texas Vitrified Pipe Co., Mineral Wells, Texas.

Conkey Filters for Sewage Sludge Disposal

180. Development of Conkey sludge filters and applications to all types of sewage sludge are described in Bulletin 100. Tables show filter sizes, weights, and give average anticipated results. Write General American Transportation Corp., Process Equip. Div., 10 East 49th St., New York 17, N. Y.

The Vacuum Filter In Your Home Town

182. That is the title of bulletin F-2005 issued by The Eimco Corp. Data on dewatering sewage sludge by actual installations are included. Write Eimco Corp., Salt Lake City 8, Utah.

WATER WORKS

Helpful Data on Swimming Pools

39. Data on injector nozzles for complete recirculation, fittings for correct drainage and other useful information for pool design are covered in Manual SP issued by Josam Mfg. Co., 335 Josam Bldg., Cleveland 13, Ohio.

Data on Modern, High-Rate Water Treatment Plant

40. This handsome 28-page bulletin gives a comprehensive yet understandably written story of the development of the Accelator, and explains its principles, advantages, design considerations, operation and applications. Helpful flow diagrams and specifications. For a copy use the coupon or write Infilco Inc., 325 W. 25th Place, Chicago 16, Ill. Ask for Bulletin 1825.

Eliminate Taste and Odor From Your Water

53. Technical pub. No. P.W. 213 issued by Wallace & Tiernan Co., Inc., Newark 1, N. J., describes in detail taste and odor control of water with Break-Point Chlorination. Sent free to any operator requesting it.

Chem-O-Feeders for Automatic Chemical Feeding

60. For chlorinating water supplies, sewage plants, swimming pools and feeding practically any chemical used in sanitation, treatment of water and sewage. Flow of water controls dosage of chemical; reagent feed is immediately adjustable. Starts and stops automatically. Literature from % Proportioneers, Inc. %, P. O. Box 1342, Providence 1, R. I.

Improved Clarification with Carter Circular Collectors

61. Latest 16-page bulletin on water and sewage equipment, No. 4906, gives complete data and specifications on Carter's three different types of clarifiers. A valuable working guide for every sanitary engineer. Ralph B. Carter Co., Dept. PW, 188 Atlantic Ave., Hackensack, N. J.

Helpful Data on Hydrants

64. Specifications for standard AWWA fire hydrants with helpful instructions for ordering, installing, repairing, lengthening and using. Issued by M. & H. Valve & Fittings Co., Dept. P.W., Anniston, Ala.

Cast Iron Pipe and Fittings For Every Need

65. Cast iron pipe and fittings for water, gas, sewer and industrial service. Super-deLavaud centrifugally-cast and pit-cast pipe. Bell-and-spigot, U. S. Joint, flanged or flexible joints can be furnished to suit requirements. Write U. S. Pipe and Foundry Co., Dept. PW, Burlington, N. J.

Turbidity, Color and Hardness Removal

77. Modern water pre-treatment with Dorr equipment and methods is described in Bulletin No. 9141, which gives basic design data and flowsheets for pre-treating highly turbid water, color removal or treatment of low turbidity, and softening. Typical analyses for various types of waters are given together with detention times in recommended treatment units. Write The Dorr Co., Dept. PW, Barry Pl., Stamford, Conn.

Job Data Offered on New Steel Water Lines

80. A 12-page illustrated report listing pipe diameters, pipe wall thicknesses, line pressures, coatings, engineering personnel, etc., is entitled "A Report of Dresser-Coupled Steel Water Lines in the Year 1948." A copy will be sent by Dresser Mfg. Div., 59 Fisher Ave., Bradford, Pa.

Keep That Trench Pumped Really Dry!

93. To find out how well a Homelite Carryable Pump handles large volume, seepage, mud, write today for illustrated bulletin L-503 containing data of great value to all pump users. Write Dept. PW, Homelite Corp., 2110 Riverdale Ave., Port Chester, N. Y.

Tested Jointing Materials

102. "Hydrotite" is a self-caulking, self-sealing joint compound for bell and spigot pipes. For data book and sample write Hydraulic Development Corp., 50 Church St., New York, N. Y.

Pressure Pipe That Retains Capacity

106. Several bulletins describing the construction of pressure pipe, list of installations,

LEAK DETECTOR
Simple and Easy to Use

Inspect Up to 2 Miles an Hour

You'll get a lot of use and satisfaction from a "Universal" Leak Detector. A factory-trained technician will make sure your own men know how to use it on your own pipe lines. It is so efficient you can make rough surveys with it at the rate of two miles per hour.

Locate Your Leaks Quickly!

You can begin locating leaks immediately. You only dig one hole when you use the "Universal" Leak Detector.

Write for full details

Write today for latest bulletin and prices.

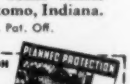
LEAK DETECTOR COMPANY
625 Hanna Building, Cleveland 15, Ohio

THE ONLY FENCE . . . . . .

Here's the only fence made of KONIK steel. No other fence gives you property protection at such low cost per year of fence life. For greater strength . . . extra elasticity . . . "clear through" rust resistance, get Continental Chain Link. Mail coupon below for more information about this better fence. Write Continental at Kokomo, Indiana.

*Trade Marks Reg. U.S. Pat. Off.

CONTINENTAL STEEL CORPORATION
Kokomo, Indiana



Please send FREE copy of "Planned Protection"—complete manual on property protection.

Name_____

Address_____

City_____ State_____

CONTINENTAL STEEL CORPORATION

FOR REPAIRING BELL AND SPIGOT JOINT LEAKS...

SKINNER-SEAL
Bell Joint Clamp for stopping bell and spigot joint leaks under pressure. Gasket is completely sealed: at bell face by Monel Metal Seal band—at spigot by hard vulcanized gasket tip.

AND BROKEN MAINS

SKINNER-SEAL
Split Coupling Clamp. One man can install in 5 to 15 minutes. Gasket sealed by Monel band. Tested to 800 lbs. line pressure. A lasting repair. 2" to 16" incl.

M. B. SKINNER CO.
SOUTH BEND 21, INDIANA, U.S.A.

USE THE
GEOPHONE
Registered in U. S. Patent Office
TO LOCATE LEAKS WITHOUT DIGGING!

Used by America's foremost water systems, government and industrial plants. Picks up vibrations from escaping water or steam at 50 feet. Also used successfully in oil, mining, and termite fields. Complete outfit of two Geophone discs, headpiece, connecting tubes, and carrying case. $85

Pipe Phones (Aquaphone) $3.70

Globe Phone Mfg. Corp.
Manufacturers of Geophones Since 1918
DEPT. P READING, MASS

WATER WORKS (Cont.)

carrying capacity tests, making service connections under pressure; and detail descriptions of several installations. Lock Joint Pipe Co., Box 269, East Orange, N. J.

Rapid Sand and Pressure Filter Data

109. Rapid sand filters. A complete line of vertical and horizontal pressure filters, wooden gravity filters, and filter tables and other equipment. For engineering data, write Roberts Filter Manufacturing Co., 640 Columbia Ave., Darby, Pa.

Get This Data for Your Laboratory

119. "Water and Sewage Analysis," a 32-page booklet, describes and illustrates equipment for making convenient and accurate water and sewage analyses, including comparators, aqua testers and turbidimeters. Hellige, Inc., 3718 Northern Blvd., Long Island City 1, N. Y.

The Modern Way to Filter Swimming Pool Water

129. That's the title of a bulletin full of facts about Bowsers' new diatomite filter to produce clear, sparkling, clean water at low cost. Occupies small space, doesn't waste water. Gives sizes to use, performance charts, etc. Write Bowser, Inc., Dept. PW, 1395 Creighton Ave., Ft. Wayne, Ind.

Find Buried Pipe The Goldak Way

131. Finding buried pipe is easy with the new Featherweight Goldak Pipe Locator. An easy-to-read illustrated bulletin tells the full story quickly. Address: The Goldak Co., 1544 Glenoaks Blvd., Glendale 1, Calif.

Data on Chlorinizer Now Available

132. Bulletin 840-F2 features the Builders Chlorinizer and shows complete details of apparatus to accurately meter chlorine gas and deliver controlled chlorine-water solution. Positive rate of flow indication, wide metering range. Get your copy of this bulletin from Builders-Providence, Inc., P. O. Box 1342, Providence 1, R. I.

All About Cement-Mortar Lining of Water Mains

133. Here, in a really beautiful booklet, is practically everything you need to know about this method of lining mains in place—the needs, methods, and results that will interest you. Centriline Corp., Dept. PW, 140 Cedar St., New York 6, N. Y.

How Elevated Water Tanks Can Save on Operating Costs

134. Beautiful new booklet on Horton elevated steel water tanks suggests ways to reduce pumping costs, increase capacity of systems, maintain uniform pressure, etc. Illustrates 7 models of welded, ellipsoidal-bottom, elevated steel tanks in full color. Write Chicago Bridge & Iron Co., 2115 McCormick Bldg., Chicago 4, Ill.

Durable Gratings and Treads Are a Good Investment

147. Gratings for walks around settling tanks and other parts of treatment plants, both out-doors and in, for stairways, floors and balconies, are described in an illustrated 16-page bulletin by Irving Subway Grating Co., 5053 27th St., Long Island City 1, N. Y.

Faster Pipe Laying With Precaulked and Threaded Joints

148. McWane 2" cast iron water pipe with threaded joints and precaulked bell and spigot pipe are described in folder WM-47. Additional data on 3" to 12" centrifugally cast pipe and fittings in folder WL-47, both issued by McWane Cast Iron Pipe Co., Birmingham 2, Ala.

Complete Equipment for The Complete Pool

157. Latest equipment for recirculation, filtration, chlorination, softening and pH control are described in Permutit Bulletin No. 2157. Manual and automatic valves explained and many installations diagrammed. Complete specifications given. Permitit Co., 330 West 42nd St., New York 18, N. Y.

Helpful Book Gives Pipe Flow

159. This handy 40-page pocket size book titled "Measurement of Water Flow Through Pipe Orifice with Free Discharge" explains the Layne pipe orifice meter method of computing water flow. Includes flow graphs for various size pipes. Layne & Bowler, Inc., Box 215, Hollywood Station, Memphis 8, Tenn.

Helpful Data on Corporation Stops

161. A complete line of brass goods for water works: corporation stops, curb stops, service pipe couplings, goosenecks and other fittings are illustrated and described in catalog W-39, issued by A. Y. McDonald Mfg. Co., Dubuque, Iowa. Get your copy for ready reference.

What You Should Know About Meter Setting and Testing Equipment

166. Complete details on all equipment and proper methods for meter testing and installation are included in an excellent book published by Ford Meter Box Co., Wabash, Ind. All waterworks men concerned with setting and testing of water meters should have a copy of this book. Write for Catalog No. 50.

Handy Calculator for Cast Iron Pipe

175. With the handy Cast Iron Pipe Calculator you can determine at a glance the class, weight and dimensions of bell and spigot pipe. This slide-rule type calculator is absolutely free. Use coupon or write R. D. Wood Company, Public Ledger Bldg., Philadelphia 5, Pa.

Locate Mains and Services Without Digging

186. A 16-page booklet tells how to use the Fisher "M-Scope" to locate buried pipes and valves by electronic means. Proper manipulation also determines depth of cover. Battery operated unit is readily carried by one man. Get data from Fisher Research Laboratory, Inc., 1961 University Ave., Palo Alto, Calif.

How Your Filter Washing Can Be Improved

188. More thorough sand washing with the elimination of mud balls and cracking with resultant longer filter runs are claimed for the Palmer Filter Bed Agitator, described in bulletins issued by the Palmer Filter Equipment Co., P. O. Box 1655, Erie, Pa.

Something Different! "Pipe Dreams" Full of Fun and Good Sense

22. The Universal Concrete Pipe Company will be glad to send you regular issues of "Pipe Dreams", their delightful pocket-size magazine full of American philosophy and good cheer. No cost or obligation. Just write Universal Concrete Pipe Company, Dept. PW, 297 South High St., Columbus 15, Ohio.

How To Eliminate Pumping Stations With Submersible Pump Units

23. Ten big advantages of submersible deep well turbine pump and waterproof electric motor units include pump house elimination, permitting installation in park or residential areas where pump house structures would not be acceptable. Available pump types cover various heads and wide capacity ranges. Complete data in Bulletin No. 49-5200 published by Byron Jackson Co., Dept. PW, Los Angeles 54, Calif.

Is Your City Metered 100%?

33. 100% metering as practiced by many cities requires accurate, dependable meters with interchangeable parts. Cut-away views of every part, capacity and size data are all included in handsome American-Niagara water meter booklet available from Buffalo Meter Co., 2920 Main St., Buffalo 14, N. Y.

How to Estimate Quantity Of Joint Compound Needed

87. The uses of Tegul-Mineralead for bell and spigot pipe and G-K Sewer joint compound are described in bulletins issued by Atlas Mineral Products Co., Mertztown, Pa. Includes useful tables for estimating quantities needed.

Cast Iron Pipe Handbook— Handy Pocket Size

97. Catalog of Universal Cast Iron Pipe and Fittings, pocket size, illustrated, including useful reference tables and data. Sent by The Central Foundry Co., Dept. P.W., 386 Fourth Ave., New York 16, N. Y.

When you need special information—consult READERS' SERVICE DEPT. on pages 85-89.

Installation Guide for Transite Pressure Pipe

192. A convenient, pocket-size book of 115 pages covers the whole job from receiving and handling pipe to pressure and leakage tests of finished lines. Over 100 drawings show important operations, and the text tells both how and why. Copies are available from Johns-Manville, Dept. PW, 22 E. 40th St., New York 16, N. Y.

CONSTRUCTION EQUIPMENT

Speed Your Work With These Powerful Motor Graders

48. Two powerful Galion motor graders designed to answer every requirement for more speed in road, airport, dam and housing construction work are fully described in a folder illustrated with many action pictures. Issued by Galion Iron Works & Mfg. Co., Galion, Ohio.

How to Keep Your Loader On the Job

50. Don't take more time to move your loader to the job than to do the work. Investigate the Eagle Truck Mounted Loader for handling gravel, sand, cinders, snow from windrows or piles. Get forms 444 and 947 from Eagle Crusher Co., Inc., Galion, Ohio.

Data and Pictures of Complete Line of New Ford Trucks

58. Check this number on the coupon for colorful circular showing new Ford Trucks for every hauling need, available in great variety of standard, factory-built chassis and body combinations. Be sure to check these trucks on your job. Truck and Fleet Sales Dept., Ford Motor Co., Dearborn, Mich.

How to Pump Debris Laden Water

63. Bulletin 167-D describes the Novo lift-and-force diaphragm pumps which feature compact design, easily opened cleanout plate and triple-life diaphragms. 3" and 4" sizes handle water laden with large amounts of debris and abrasives, and containing large percentages of air. Copies from Novo Engine Co., Lansing 5, Mich.

Tractors for Counties, Cities and Contractors

76. An attractive 24-page catalog portrays the Allis-Chalmers HD-5 crawler's abundant capacity and ability to meet the variable needs of counties, townships and contractors. Photographs and cutaway views illustrate its rugged construction and simplified maintenance. Use coupon or write Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee 1, Wisc.

New 15,000 GPH Pump Weighs Only 57 Pounds With Engine

150. Together, the 5-HP engine and 15,000 GPH (250 GPM) pump just introduced by McCulloch weigh only 57 pounds. Pump has 28-ft. suction lift; 3-in. outlet and inlet; automatic governor. Get complete information in Bulletin 4960 from McCulloch Motors Corp., Dept. PW, Los Angeles 45, Calif.

Hydraulic Dump Bodies Feature Trouble-Free Hoist

165. Get data on Heil Twin-Arm hoists and bodies for 1½ to 2½ ton trucks and learn how reliable hoist and sturdy body will keep your truck in service with less repair and maintenance. Bulletin BH 4662-G gives details. The Heil Co., Dept. PW, 3000 W. Montana St., Milwaukee 1, Wisc.

Your Property is Worth Good Protection

176. When installing link fence you want protection against rust and corrosion as well as vandalism. Investigate chain link fence made of "Konik" metal described in "Planned Protection" published by Continental Steel Corp., Kokomo, Ind.

52-Page Data-Packed Bulletin On Contractors' Pumps

95. Tables for pump size determination on every excavation job, pipe friction loss, attitude effects and lots of other valuable data are included in this comprehensive booklet illustrating the many Jaeger "sure-prime" pump applications. Get your copy (catalog P45) by checking our coupon or writing the Jaeger Machine Co., Dept. PW, Columbus 16, Ohio.

Mack Trucks for Every Road Building Job

184. An illustrated bulletin entitled "Mack Builds the Highways of the Future" tells the story of Mack trucks on the heavy work of highway building and shows how Mack design meets the extra demands of this use. Copies available from Mack Mfg. Corp., Empire State Building, New York 1, N. Y.

POWER AND LIGHT

Using Sewage Sludge Gas For Power Generation

27. A new 8-page illustrated bulletin, No. 4811, describes Superior Dual Fuel Diesel engine operation and illustrates the simplicity of controls with fuel conversion by either push buttons or hand lever. Copies are available from Superior Engine Div., Dept. PW, The National Supply Co., Springfield, Ohio.

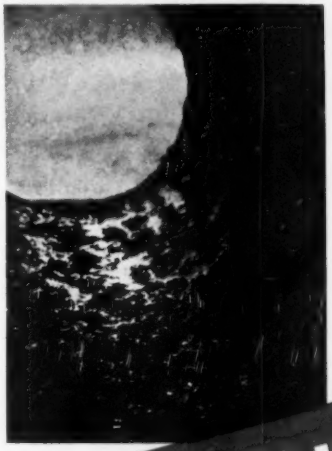
Air Cooled Engines for Hundreds of Applications

137. Tested under severest conditions of long, hard use, these engines have earned world wide recognition as the "right" power for hundreds of applications. Get latest bulletin from Dept. PW, Briggs and Stratton Corp., Milwaukee 1, Wisc.

Low Cost Power From Dual Fuel Engines

154. Operating on the Diesel cycle, burning either oil or gas, the Worthington Supercharged Dual Fuel Diesels give high economies by running on the cheapest fuel available. Get complete data from Worthington Pump & Machinery Corp., Dept. PW, Harrison, N. J.

▶ PIPE LINING FACTS NO. 1 ◀



▶▶▶ CENTRILINE restores the original carrying capacity of old water mains at reasonable cost by the centrifugal application of a cement lining. This smooth, dense, continuous coating defies corrosion and tuberculation. Hence, carrying capacity is sustained for the lifetime of the main.

The ever-smooth, protective lining centrifugally applied by Centriline in some instances has increased carrying capacity beyond the rate of the pipeline when originally installed. This is due to the homogeneity of the lining which covers seams, joints and rivet heads.

If mains are losing their efficiency, consult with our experienced hydraulic engineers.

CENTRILINE
PERMANENTLY INCREASES CARRYING CAPACITY

CENTRILINE CORPORATION
A subsidiary of Raymond Concrete Pile Co.
140 CEDAR STREET • NEW YORK 6, N. Y.
Branch Offices in all Principal Cities in the United States and Latin America.

Cement Mortar Linings for Water Mains
Centrifugally Applied In Strict Conformity with A. W. W. A. Specifications

▶▶▶ WRITE TODAY FOR THE 28-PAGE CENTRILINE CATALOG

BE AGIN THEM!

Rail against constantly-flowing drinking fountains and leaking hydrants. Water is fluid money.

Self-closing, non-leaking hydrants are made by MURDOCK.

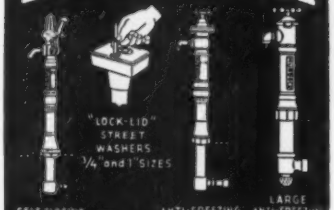
MURDOCK

Pedal-operated Drinking Fountains discourage playfulness.

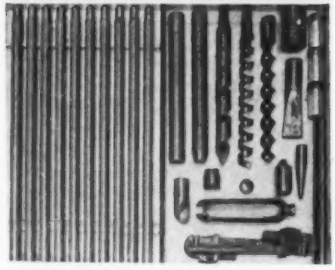
MURDOCK Fixtures pay for themselves over and over again in the water they save during their long life.

The Murdock Mfg. & Supply Co.
Cincinnati 2, Ohio

MURDOCK


"LOCK-LID" STREET WASHERS ¼" and 1" SIZES
SELF-CLOSING ANTI-FREEZING HYDRANT
ANTI-FREEZING COMPRESSION HYDRANT
LARGE ANTI-FREEZING HYDRANTS 1½" TO 2" INCLUSIVE

SOIL SAMPLING KIT



• 12 soil and earth sampling tools in handy steel box.

• Can be carried in any automobile.

30 years experience has proved these tools will recover accurate samples from practically all earth materials.

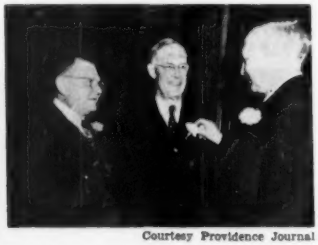
• MANY USES—brick and clay materials — foundation test borings — gold bearing sands — kaolin and clay for ceramics — sand and gravel pits — **subgrade testing for highways and airfield runways** — base materials.

• *Send for Bulletin 26-PW* •

ACKER DRILL CO., INC.
SCRANTON 3, PA.

WORTH TELLING . . . By Arthur K. Akers

Builders Iron Foundry, Providence, is high in newsworthiness this month. First, after 130 years on Codding Street, they have a brand new general office at 345 Harris Avenue. **Builders-Providence, Inc., % Proportioneers Inc. %,** and **Omega Machine Company** move there, too. Second, you see below **Prof. Zechariah Chafee, Jr.,** chairman of the board, presenting to his brother **Henry S. Chafee,** president and treasurer, the Builders Iron Foundry 40-year Service Award. **"Rollie" Leveque** of **Omega** was toastmaster at the 265-plate presentation dinner.



Courtesy Providence Journal

Right to left: Prof. Chafee, Mr. Chafee and Mr. Januzewski.

•

Fred E. Bibb of **Ludlow Valve Manufacturing Company,** Troy, N. Y. announces reopening of their Houston, Texas, sales representation under **Harry D. Bryan,** at 2415 San Jacinto.

•

Seth T. Reese, Jr., has been appointed engineer and administrative assistant on the staff of Managing Director **Edw. W. Bauman** of the **National Slag Association,** Washington.

•

R. S. Stevenson is the new general sales manager of **Allis-Chalmers** Tractor Division, Milwaukee.

•

George C. Dodge, president of **The Elgin Corporation,** 501 Fifth Avenue, New York, bulletins that Elgin will now merchandise the Aero-Mist power sprayers for pest control manufactured by **Lawrence Aero-Mist Sprayer Co.**

•

Ralph A. Ferreira, general sales manager of **The Robinson Clay Product Company,** Akron, was cited at a special ceremony in the firm's main offices on his 25th anniversary with the company, March 15. He is also chairman of the advertising committee of the **Clay Sewer Pipe Association.**

•

W. A. Riddell Co., Bucyrus, Ohio, has appointed Southeastern Sales Co. at Harlan, Ky., and Construction Equipment Sales Co., St. Paul, as regional distributors for Warco motor graders and Hercules road rollers.

•

Edmund D. Haigler has just joined **Fischer and Porter Company,** Hatboro, Pa., to work on special customer engineering problems.

•

Hall Laboratories, of Pittsburgh, (Calgon and Banox to you) have our idea of the right way to celebrate a firm's silver anniversary—52 executives and others off to Florida last month for a 4-days meeting.

•

Kerrigan Iron Works, Nashville, Tenn., appoints **H. E. Maser,** Grant Bldg., Pittsburgh, as representative in that area on their grating, stair treads, street lighting standards, etc.

•

Frank S. Foster, assistant sales manager, eastern division of Caterpillar Tractor Co., Peoria, Ill., moves to the same position, western division. Alabamian **Gordon J. Fowler** is promoted to Mr. Foster's former post.

Mr. Foster

•

Visiting our friends at the **R. D. Cole Manufacturing Company** (tanks) down in Newnan, Ga., one hot day last January, we passed the stout structure known to the local African populace as "de jail house."

Behind its barred but open upper windows lounged a group that had achieved all the securities of the "welfare state."

"What time is it by de clock?" called down a prisoner to a friend below.

Up from the alley came this all-inclusive answer: "Boy, what you care what time it is? **You** ain't going nowhere."

145-h.p. Series F-8 Big Job, with special tandem rear axle, one of over 175 Ford Economy Truck models, has an allowable G.V.W. rating as a six-wheeler of 35,000 lbs.

"We doubled tonnage...cut rock delivery costs about 33%"—SAYS H. B. GRAHAM, PUEBLO, COLORADO

"WHAT A TERRIFIC JOB our nine Ford F-8 Big Jobs are doing on the Pueblo to Canon City highway," reports H. B. Graham.

"We have doubled tonnage per day over our previous trucks. And you should see our drivers scramble for a Ford when a new one is delivered. They think the new Fords are the greatest things that ever happened in trucking. I share that opinion because we've cut rock delivery costs about 33%."

Ford trucks do more work! They're Bonus Built with big reserves of strength and power to handle big loads. *Ford trucking costs less!* Volume production know-how results in low original price. Truck engineering know-how keeps operating costs low.

See your Ford Dealer today! Choose from over 175 models ranging from 95-h.p. Pickups to 145-h.p. Big Jobs. G.V.W. ratings from 4,700 lbs. to 22,000 lbs. There's a Ford Truck to fit your job and your budget. And, remember, Ford Trucks "do more per dollar!"

SAVE WITH FORD!
AMERICA'S NO.1 TRUCK VALUE!

★ **SAVE GAS** with Ford Loadomatic Ignition and High Turbulence combustion chambers.

★ **SAVE OIL** with Ford Flightlight aluminum alloy pistons. Cam ground for oil-saving fit at operating temperatures.

★ **SAVE WEAR** with pressure lubricated main and crankpin bearings, Double Channel frame, extra heavy duty axles, big brakes (up to 16-in. by 5-in.)

★ **SAVE ON REPAIRS** with demountable brake drums, brake inspection hole, engine-top setting of accessories, plus nationwide service from over 6,400 Ford Dealers.

★ **SAVE TIME** with Ford reliability and performance. The only eight-cylinder engines in trucking. Only Ford gives you a choice of V-8 or Six!

Ford Trucking Costs Less Because—

FORD TRUCKS LAST LONGER

Using latest registration data on 6,592,000 trucks, life insurance experts prove Ford Trucks last longer!

MAIL THIS COUPON TODAY!

FORD Division of FORD MOTOR COMPANY
3257 Schaefer Rd., Dearborn, Mich.

Send me without charge or obligation, detail specifications on Ford Trucks for 1950.

FULL LINE ☐ **HEAVY DUTY MODELS** ☐
LIGHT MODELS ☐ **EXTRA HEAVY DUTY MODELS** ☐

Name _____
(Please print plainly)

Address _____

City _____ *Zone* _____ *State* _____

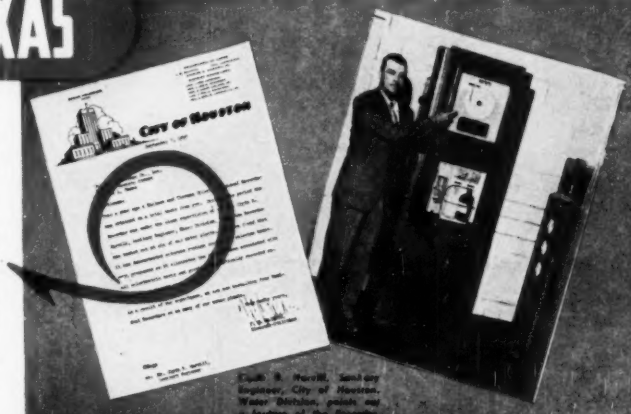
THE W&T RESIDUAL RECORDER

so good they order MORE ..

at HOUSTON, TEXAS

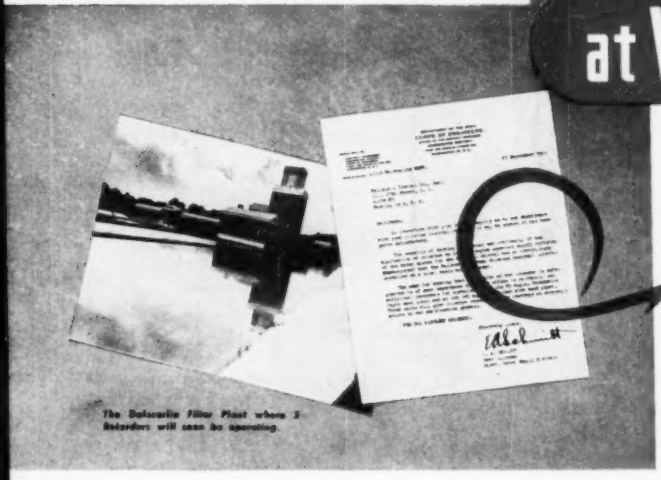
where a W&T Residual Recorder was installed on a trial basis and for several months put through a series of rigorous, exacting tests at six of the Houston Water Plants.

The performance of the Recorder in these tests is described by Mr. E. N. Baldwin, Director of Utilities, who writes in a recent letter "***We have found that it eliminates the inaccuracies associated with all colorimetric tests and provides automatically recorded results for permanent records. As a result of our experience, we are now installing four Residual Recorders at as many of our water plants."



Frank P. Harvill, Sanitary Engineer, City of Houston, Water Division, points out a feature of the Recorder.

at WASHINGTON, D.C.



The Dalecarlia Filter Plant where 5 Recorders will soon be operating.

At the 85 mgd Dalecarlia Filter Plant serving the nation's capital, a W&T Residual Recorder was installed to measure the residual of the filter effluent. The results were so effective that Mr. E. A. Schmitt, Head Engineer, Chief of the Water Supply Division writes:

"***The need for knowing that the health of the consumer is safeguarded is of such importance that this office is purchasing six additional recorders for installation at its 85 mgd Dalecarlia rapid sand plant and at the 100 mgd McMillan slow sand plant. These units will give chlorine residual sample readings at strategic points in the purification process."

All the advantages of residual recording such as improved chlorine usage, better chlorination control and smoother plant operation typified by these and other installations at Cleveland, Richmond, Kansas City, and Atlanta can be obtained for your plant too. Just call your nearest W&T Representative for full details today.

S-53

WALLACE & TIERNAN
COMPANY, INC.
CHLORINE AND CHEMICAL CONTROL EQUIPMENT
NEWARK 1, NEW JERSEY • REPRESENTED IN PRINCIPAL CITIES